

SEQUENCE LISTING

10 Res'd PCT/PTO

22 APR 2005

<110> ESCAICH, Sonia

<120> New Products Specific to Pathogenic Strains and Their  
Use as Vaccines and in Immunotherapy

<130> 1721-81

<140> 10/506,666

<141> 2004-10-27

<150> PCT/EP03/02925

<151> 2003-03-06

<150> EP02290556.6

<151> 2002-03-06

<160> 158

<170> PatentIn version 3.1

<210> 1

<211> 163

<212> PRT

<213> Escherichia coli

<400> 1

Met Lys Leu Lys Ala Ile Ile Leu Ala Thr Gly Leu Ile Asn Cys Ile  
1 5 10 15

Val Phe Ser Ala Gln Ala Val Asp Thr Thr Ile Thr Val Thr Gly Asn  
20 25 30

Val Leu Gln Arg Thr Cys Asn Val Pro Gly Asn Val Asp Val Ser Leu  
35 40 45

Gly Asn Leu Tyr Val Ser Asp Phe Pro Asn Ala Gly Ser Gly Ser Pro  
50 55 60

Trp Val Asn Phe Asp Leu Ser Leu Thr Gly Cys Gln Asn Met Asn Thr  
65 70 75 80

Val Arg Ala Thr Phe Ser Gly Thr Ala Asp Gly Gln Thr Tyr Tyr Ala  
85 90 95

Asn Thr Gly Asn Ala Gly Gly Ile Lys Ile Glu Ile Gln Asp Arg Asp  
100 105 110

Gly Ser Asn Ala Ser Tyr His Asn Gly Met Phe Lys Thr Leu Asn Val  
115 120 125

Gln Asn Asn Asn Ala Thr Phe Asn Leu Lys Ala Arg Ala Val Ser Lys  
130 135 140

Gly Gln Val Thr Pro Gly Asn Ile Ser Ser Val Ile Thr Val Thr Tyr  
145 150 155 160

Thr Tyr Ala

<210> 2  
<211> 673  
<212> PRT

<213> Escherichia coli

<400> 2

Met Lys Met Thr Arg Leu Tyr Pro Leu Ala Leu Gly Gly Leu Leu Leu  
1 5 10 15

Pro Ala Ile Ala Asn Ala Gln Thr Ser Gln Gln Asp Glu Ser Thr Leu  
20 25 30

Val Val Thr Ala Ser Lys Gln Ser Ser Arg Ser Ala Ser Ala Asn Asn  
35 40 45

Val Ser Ser Thr Val Val Ser Ala Pro Glu Leu Ser Asp Ala Gly Val  
50 55 60

Thr Ala Ser Asp Lys Leu Pro Arg Val Leu Pro Gly Leu Asn Ile Glu  
65 70 75 80

Asn Ser Gly Asn Met Leu Phe Ser Thr Ile Ser Leu Arg Gly Val Ser  
85 90 95

Ser Ala Gln Asp Phe Tyr Asn Pro Ala Val Thr Leu Tyr Val Asp Gly  
100 105 110

Val Pro Gln Leu Ser Thr Asn Thr Ile Gln Ala Leu Thr Asp Val Gln  
115 120 125

Ser Val Glu Leu Leu Arg Gly Pro Gln Gly Thr Leu Tyr Gly Lys Ser  
130 135 140

Ala Gln Gly Gly Ile Ile Asn Ile Val Thr Gln Gln Pro Asp Ser Thr  
145 150 155 160

Pro Arg Gly Tyr Ile Glu Gly Gly Val Ser Ser Arg Asp Ser Tyr Arg  
165 170 175

Ser Lys Phe Asn Leu Ser Gly Pro Ile Gln Asp Gly Leu Leu Tyr Gly  
180 185 190

Ser Val Thr Leu Leu Arg Gln Val Asp Asp Gly Asp Met Ile Asn Pro  
195 200 205

Ala Thr Gly Ser Asp Asp Leu Gly Gly Thr Arg Ala Ser Ile Gly Asn  
210 215 220

Val Lys Leu Arg Leu Ala Pro Asp Asp Gln Pro Trp Glu Met Gly Phe  
225 230 235 240

Ala Ala Ser Arg Glu Cys Thr Arg Ala Thr Gln Asp Ala Tyr Val Gly  
245 250 255

Trp Asn Asp Ile Lys Gly Arg Lys Leu Ser Ile Ser Asp Gly Ser Pro  
260 265 270

Asp Pro Tyr Met Arg Arg Cys Thr Asp Ser Gln Thr Leu Ser Gly Lys  
275 280 285

Tyr Thr Thr Asp Asp Trp Val Phe Asn Leu Ile Ser Ala Trp Gln Gln  
290 295 300

Gln His Tyr Ser Arg Thr Phe Pro Ser Gly Ser Leu Ile Val Asn Met  
305 310 315 320

Ser Gln Arg Trp Asn Gln Asp Val Gln Glu Leu Arg Ala Ala Thr Leu  
325 330 335

Gly Asp Ala Arg Thr Val Asp Met Val Phe Gly Leu Tyr Arg Gln Asn  
340 345 350

Thr Arg Glu Lys Leu Asn Ser Ala Tyr Asp Met Pro Thr Met Pro Tyr  
355 360 365

Leu Ser Ser Thr Gly Tyr Thr Thr Ala Glu Thr Leu Ala Ala Tyr Ser  
370 375 380

Asp Leu Thr Trp His Leu Thr Asp Arg Phe Asp Ile Gly Gly Gly Val  
385 390 395 400

Arg Phe Ser His Asp Lys Ser Ser Thr Gln Tyr His Gly Ser Met Leu  
405 410 415

Gly Asn Pro Phe Gly Asp Gln Gly Lys Ser Asn Asp Asp Gln Val Leu  
420 425 430

Gly Gln Leu Ser Ala Gly Tyr Met Leu Thr Asp Asp Trp Arg Val Tyr  
435 440 445

Thr Arg Val Ala Gln Gly Tyr Lys Pro Ser Gly Tyr Asn Ile Val Pro  
450 455 460

Thr Ala Gly Leu Asp Ala Lys Pro Phe Val Ala Glu Lys Ser Ile Asn  
465 470 475 480

Tyr Glu Leu Gly Thr Arg Tyr Glu Thr Ala Asp Val Thr Leu Gln Ala  
485 490 495

Ala Thr Phe Tyr Thr His Thr Lys Asp Met Gln Leu Tyr Ser Gly Pro  
500 505 510

Val Gly Met Gln Thr Leu Ser Asn Ala Gly Lys Ala Asp Ala Thr Gly  
515 520 525

Val Glu Leu Glu Ala Lys Trp Arg Phe Ala Pro Gly Trp Ser Trp Asp  
530 535 540

Ile Asn Gly Asn Val Ile Arg Ser Glu Phe Thr Asn Asp Ser Glu Leu  
545 550 555 560

Tyr His Gly Asn Arg Val Pro Phe Val Pro Arg Tyr Gly Ala Gly Ser  
565 570 575



Ser Val Asn Gly Val Ile Asp Thr Arg Tyr Gly Ala Leu Met Pro Arg  
580 585 590

Leu Ala Val Asn Leu Val Gly Pro His Tyr Phe Asp Gly Asp Asn Gln  
595 600 605

Leu Arg Gln Gly Thr Tyr Ala Thr Leu Asp Ser Ser Leu Gly Trp Gln  
610 615 620

Ala Thr Glu Arg Met Asn Ile Ser Val Tyr Val Asp Asn Leu Phe Asp  
625 630 635 640

Arg Arg Tyr Arg Thr Tyr Gly Tyr Met Asn Gly Ser Ser Ala Val Ala  
645 650 655

Gln Val Asn Met Gly Arg Thr Val Gly Ile Asn Thr Arg Ile Asp Phe  
660 665 670

Phe

<210> 3  
<211> 246  
<212> PRT  
<213> Escherichia coli

<400> 3

Met Asn Lys Val Phe Val Val Ser Val Val Ala Ala Ala Cys Val Phe  
1 5 10 15

Ala Val Asn Ala Gly Ala Lys Glu Gly Lys Ser Gly Phe Tyr Leu Thr  
20 25 30

Gly Lys Ala Gly Ala Ser Val Met Ser Leu Ser Asp Gln Arg Phe Leu  
35 40 45

Ser Gly Asp Glu Glu Glu Thr Ser Lys Tyr Lys Gly Gly Asp Asp His  
50 55 60

Asp Thr Val Phe Ser Gly Gly Ile Ala Val Gly Tyr Asp Phe Tyr Pro  
65 70 75 80

Gln Phe Ser Ile Pro Val Arg Thr Glu Leu Glu Phe Tyr Ala Arg Gly

85

90

95

Lys Ala Asp Ser Lys Tyr Asn Val Asp Lys Asp Ser Trp Ser Gly Gly  
 100 105 110

Tyr Trp Arg Asp Asp Leu Lys Asn Glu Val Ser Val Asn Thr Leu Met  
 115 120 125

Leu Asn Ala Tyr Tyr Asp Phe Arg Asn Asp Ser Ala Phe Thr Pro Trp  
 130 135 140

Val Ser Ala Gly Ile Gly Tyr Ala Arg Ile His Gln Lys Thr Thr Gly  
 145 150 155 160

Ile Ser Thr Trp Asp Tyr Glu Tyr Gly Ser Ser Gly Arg Glu Ser Leu  
 165 170 175

Ser Arg Ser Gly Ser Ala Asp Asn Phe Ala Trp Ser Leu Gly Ala Gly  
 180 185 190

Val Arg Tyr Asp Val Thr Pro Asp Ile Ala Leu Asp Leu Ser Tyr Arg  
 195 200 205

Tyr Leu Asp Ala Gly Asp Ser Ser Val Ser Tyr Lys Asp Glu Trp Gly  
 210 215 220

Asp Lys Tyr Lys Ser Glu Val Asp Val Lys Ser His Asp Ile Met Leu  
 225 230 235 240

Gly Met Thr Tyr Asn Phe  
 245

<210> 4

<211> 166

<212> PRT

<213> Escherichia coli

<400> 4

Met Lys Leu Lys Ala Ile Ile Leu Ala Thr Gly Leu Ile Asn Cys Ile  
 1 5 10 15

Ala Phe Ser Ala Gln Ala Val Asp Thr Thr Ile Thr Val Thr Gly Arg  
 20 25 30

Val Leu Pro Arg Thr Cys Thr Ile Gly Asn Gly Gly Asn Pro Asn Ala  
35 40 45

Thr Val Val Leu Asp Asn Ala Tyr Thr Ser Asp Leu Ile Ala Ala Asn  
50 55 60

Ser Thr Ser Gln Trp Lys Asn Phe Ser Leu Thr Leu Thr Asn Cys Gln  
65 70 75 80

Asn Val Asn Asn Val Thr Ser Phe Gly Gly Thr Ala Glu Asn Thr Asn  
85 90 95

Tyr Tyr Arg Asn Thr Gly Asp Ala Thr Asn Ile Met Val Glu Leu Gln  
100 105 110

Glu Gln Gly Asn Gly Asn Thr Pro Leu Lys Val Gly Ser Thr Lys Val  
115 120 125

Val Thr Val Ser Asn Gly Gln Ala Thr Phe Asn Leu Lys Val Arg Ala  
130 135 140

Val Ser Lys Gly Asn Ala Gly Ala Gly Ser Ile Asn Ser Gln Ile Thr  
145 150 155 160

Val Thr Tyr Thr Tyr Ala  
165

<210> 5  
<211> 1295  
<212> PRT

<213> Escherichia coli

<400> 5

Met Asn Lys Ile Tyr Ser Leu Lys Tyr Ser Ala Ala Thr Gly Gly Leu  
1 5 10 15

Ile Ala Val Ser Glu Leu Ala Lys Arg Val Ser Gly Lys Thr Asn Arg  
20 25 30

Lys Leu Val Ala Thr Met Leu Ser Leu Ala Val Ala Gly Thr Val Asn  
35 40 45

Ala Ala Asn Ile Asp Ile Ser Asn Val Trp Ala Arg Asp Tyr Leu Asp  
50 55 60

Leu Ala Gln Asn Lys Gly Ile Phe Gln Pro Gly Ala Thr Asp Val Thr  
65 70 75 80

Ile Thr Leu Lys Asn Gly Asp Lys Phe Ser Phe His Asn Leu Ser Ile  
85 90 95

Pro Asp Phe Ser Gly Ala Ala Ala Ser Gly Ala Ala Thr Ala Ile Gly  
100 105 110

Gly Ser Tyr Ser Val Thr Val Ala His Asn Lys Lys Asn Pro Gln Ala  
115 120 125

Ala Glu Thr Gln Val Tyr Ala Gln Ser Ser Tyr Arg Val Val Asp Arg  
130 135 140

Arg Asn Ser Asn Asp Phe Glu Ile Gln Arg Leu Asn Lys Phe Val Val  
145 150 155 160

Glu Thr Val Gly Ala Thr Pro Ala Glu Thr Asn Pro Thr Thr Tyr Ser  
165 170 175

Asp Ala Leu Glu Arg Tyr Gly Ile Val Thr Ser Asp Gly Ser Lys Lys  
180 185 190

Ile Ile Gly Phe Arg Ala Gly Ser Gly Gly Thr Ser Phe Ile Asn Gly  
195 200 205

Glu Ser Lys Ile Ser Thr Asn Ser Ala Tyr Ser His Asp Leu Leu Ser  
210 215 220

Ala Ser Leu Phe Glu Val Thr Gln Trp Asp Ser Tyr Gly Met Met Ile  
225 230 235 240

Tyr Lys Asn Asp Lys Thr Phe Arg Asn Leu Glu Ile Phe Gly Asp Ser  
245 250 255

Gly Ser Gly Ala Tyr Leu Tyr Asp Asn Lys Leu Glu Lys Trp Val Leu  
260 265 270

Val Gly Thr Thr His Gly Ile Ala Ser Val Asn Gly Asp Gln Leu Thr  
275 280 285

Trp Ile Thr Lys Tyr Asn Asp Lys Leu Val Ser Glu Leu Lys Asp Thr  
290 295 300

Tyr Ser His Lys Ile Asn Leu Asn Gly Asn Asn Val Thr Ile Lys Asn  
305 310 315 320

Thr Asp Ile Thr Leu His Gln Asn Asn Ala Asp Thr Thr Gly Thr Gln  
325 330 335

Glu Lys Ile Thr Lys Asp Lys Asp Ile Val Phe Thr Asn Gly Gly Asp  
340 345 350

Val Leu Phe Lys Asp Asn Leu Asp Phe Gly Ser Gly Gly Ile Ile Phe  
355 360 365

Asp Glu Gly His Glu Tyr Asn Ile Asn Gly Gln Gly Phe Thr Phe Lys  
370 375 380

Gly Ala Gly Ile Asp Ile Gly Lys Glu Ser Ile Val Asn Trp Asn Ala  
385 390 395 400

Leu Tyr Ser Ser Asp Asp Val Leu His Lys Ile Gly Pro Gly Thr Leu  
405 410 415

Asn Val Gln Lys Lys Gln Gly Ala Asn Ile Lys Ile Gly Glu Gly Asn  
420 425 430

Val Ile Leu Asn Glu Glu Gly Thr Phe Asn Asn Ile Tyr Leu Ala Ser  
435 440 445

Gly Asn Gly Lys Val Ile Leu Asn Lys Asp Asn Ser Leu Gly Asn Asp  
450 455 460

Gln Tyr Ala Gly Ile Phe Phe Thr Lys Arg Gly Gly Thr Leu Asp Leu  
465 470 475 480

Asn Gly His Asn Gln Thr Phe Thr Arg Ile Ala Ala Thr Asp Asp Gly  
485 490 495

Thr Thr Ile Thr Asn Ser Asp Thr Thr Lys Glu Ala Val Leu Ala Ile  
500 505 510

Asn Asn Glu Asp Ser Tyr Ile Tyr His Gly Asn Ile Asn Gly Asn Ile  
515 520 525

Lys Leu Thr His Asn Ile Asn Ser Gln Asp Lys Lys Thr Asn Ala Lys  
530 535 540

Leu Ile Leu Asp Gly Ser Val Asn Thr Lys Asn Asp Val Glu Val Ser  
545 550 555 560

Asn Ala Ser Leu Thr Met Gln Gly His Ala Thr Glu His Ala Ile Phe  
565 570 575

Arg Ser Ser Ala Asn His Cys Ser Leu Val Phe Leu Cys Gly Thr Asp  
580 585 590

Trp Val Thr Val Leu Lys Glu Thr Glu Ser Ser Tyr Asn Lys Lys Phe  
595 600 605

Asn Ser Asp Tyr Lys Ser Asn Asn Gln Gln Thr Ser Phe Asp Gln Pro  
610 615 620

Asp Trp Lys Thr Gly Val Phe Lys Phe Asp Thr Leu His Leu Asn Asn  
625 630 635 640

Ala Asp Phe Ser Ile Ser Arg Asn Ala Asn Val Glu Gly Asn Ile Ser  
645 650 655

Ala Asn Lys Ser Ala Ile Thr Ile Gly Asp Lys Asn Val Tyr Ile Asp  
660 665 670

Asn Leu Ala Gly Lys Asn Ile Thr Asn Asn Gly Phe Asp Phe Lys Gln  
675 680 685

Thr Ile Ser Thr Asn Leu Ser Ile Gly Glu Thr Lys Phe Thr Gly Gly  
690 695 700

Ile Thr Ala His Asn Ser Gln Ile Ala Ile Gly Asp Gln Ala Val Val  
705 710 715 720

Thr Leu Asn Gly Ala Thr Phe Leu Asp Asn Thr Pro Ile Ser Ile Asp  
725 730 735

Lys Gly Ala Lys Val Ile Ala Gln Asn Ser Met Phe Thr Thr Lys Gly  
740 745 750

Ile Asp Ile Ser Gly Glu Leu Thr Met Met Gly Ile Pro Glu Gln Asn  
755 760 765

Ser Lys Thr Val Thr Pro Gly Leu His Tyr Ala Ala Asp Gly Phe Arg  
770 775 780

Leu Ser Gly Gly Asn Ala Asn Phe Ile Ala Arg Asn Met Ala Ser Val  
785 790 795 800

Thr Gly Asn Ile Tyr Ala Asp Asp Ala Ala Thr Ile Thr Leu Gly Gln  
805 810 815

Pro Glu Thr Glu Thr Pro Thr Ile Ser Ser Ala Tyr Gln Ala Trp Ala  
820 825 830

Glu Thr Leu Leu Tyr Gly Phe Asp Thr Ala Tyr Arg Gly Ala Ile Thr  
835 840 845

Ala Pro Lys Ala Thr Val Ser Met Asn Asn Ala Ile Trp His Leu Asn  
850 855 860

Ser Gln Ser Ser Ile Asn Arg Leu Glu Thr Lys Asp Ser Met Val Arg  
865 870 875 880

Phe Thr Gly Asp Asn Gly Lys Phe Thr Thr Leu Thr Val Asn Asn Leu  
885 890 895

Thr Ile Asp Asp Ser Ala Phe Val Leu Arg Ala Asn Leu Ala Gln Ala  
900 905 910

Asp Gln Leu Val Val Asn Lys Ser Leu Ser Gly Lys Asn Asn Leu Leu  
915 920 925

Leu Val Asp Phe Ile Glu Lys Asn Gly Asn Ser Asn Gly Leu Asn Ile  
930 935 940

Asp Leu Val Ser Ala Pro Lys Gly Thr Ala Val Asp Val Phe Lys Ala  
945 950 955 960

Thr Thr Arg Ser Ile Gly Phe Ser Asp Val Thr Pro Val Ile Glu Gln  
965 970 975

Lys Asn Asp Thr Asp Lys Ala Thr Trp Thr Leu Ile Gly Tyr Lys Ser  
980 985 990

Val Ala Asn Ala Asp Ala Ala Lys Lys Ala Thr Leu Leu Met Ser Gly  
995 1000 1005

Gly Tyr Lys Ala Phe Leu Ala Glu Val Asn Asn Leu Asn Lys Arg  
1010 1015 1020

Met Gly Asp Leu Arg Asp Ile Asn Gly Glu Ser Gly Ala Trp Ala  
1025 1030 1035

Arg Ile Ile Ser Gly Thr Gly Ser Ala Gly Gly Gly Phe Ser Asp  
1040 1045 1050

Asn Tyr Thr His Val Gln Val Gly Ala Asp Asn Lys His Glu Leu  
1055 1060 1065

Asp Gly Leu Asp Leu Phe Thr Gly Val Thr Met Thr Tyr Thr Asp  
1070 1075 1080

Ser His Ala Gly Ser Asp Ala Phe Ser Gly Glu Thr Lys Ser Val  
1085 1090 1095

Gly Ala Gly Leu Tyr Ala Ser Ala Met Phe Glu Ser Gly Ala Tyr  
1100 1105 1110

Ile Asp Leu Ile Gly Lys Tyr Val His His Asp Asn Glu Tyr Thr  
1115 1120 1125

Ala Thr Phe Ala Gly Leu Gly Thr Arg Asp Tyr Ser Ser His Ser  
1130 1135 1140

Trp Tyr Ala Gly Ala Glu Val Gly Tyr Arg Tyr His Val Thr Asp  
1145 1150 1155

Ser Ala Trp Ile Glu Pro Gln Ala Glu Leu Val Tyr Gly Ala Val



1160

1165

1170

Ser Gly Lys Gln Phe Ser Trp Lys Asp Gln Gly Met Asn Leu Thr  
 1175 1180 1185

Met Lys Asp Lys Asp Phe Asn Pro Leu Ile Gly Arg Thr Gly Val  
 1190 1195 1200

Asp Val Gly Lys Ser Phe Ser Gly Lys Asp Trp Lys Val Thr Ala  
 1205 1210 1215

Arg Ala Gly Leu Gly Tyr Gln Phe Asp Leu Phe Ala Asn Gly Glu  
 1220 1225 1230

Thr Val Leu Arg Asp Ala Ser Gly Glu Lys Arg Ile Lys Gly Glu  
 1235 1240 1245

Lys Asp Gly Arg Met Leu Met Asn Val Gly Leu Asn Ala Glu Ile  
 1250 1255 1260

Arg Asp Asn Leu Arg Phe Gly Leu Glu Phe Glu Lys Ser Ala Phe  
 1265 1270 1275

Gly Lys Tyr Asn Val Asp Asn Ala Ile Asn Ala Asn Phe Arg Tyr  
 1280 1285 1290

Ser Phe  
 1295

<210> 6  
 <211> 142  
 <212> PRT

<213> Escherichia coli

<400> 6

Met Ile Asn Ile Pro Ser Pro Thr Ala Val Val Met Ala Leu Val Ala  
 1 5 10 15

Ile Ser Thr Leu Pro Ser Pro Ser Arg Val Lys Leu Met Pro Tyr Pro  
 20 25 30

Pro Arg Ala His Asn Thr Thr Gly Leu Leu Pro Val Arg Glu Ile Cys  
 35 40 45

Phe Pro His His Gly Asp Asp Gly Arg Asn Ser Ile Glu Pro Ser Ile  
50 55 60

Ser Arg Ala Ala His Thr Asp Arg Leu Arg Phe Val Cys Met Thr Arg  
65 70 75 80

Thr Gly Ser Thr Thr Ser Arg Pro Phe Cys Pro Ile Pro Arg Ser Pro  
85 90 95

Ala Leu Asn Ala Ser Gly Gln Gln Asp Ser Gly Phe Trp Gly Val Ser  
100 105 110

Ser Ile Pro Gly Asp Ile Leu Met Phe Gln Leu His Val Leu Ile Val  
115 120 125

Phe Ile Cys Lys Ile Asn Leu Ser Asp Asn Asn Ile Ser Tyr  
130 135 140

<210> 7  
<211> 318  
<212> PRT

<213> Escherichia coli

<400> 7

Met Tyr Ala Arg Glu Tyr Arg Ser Thr Arg Pro His Lys Ala Ile Phe  
1 5 10 15

Phe His Leu Ser Cys Leu Thr Leu Ile Cys Ser Ala Gln Val Tyr Ala  
20 25 30

Lys Pro Asp Met Arg Pro Leu Gly Pro Asn Ile Ala Asp Lys Gly Ser  
35 40 45

Val Phe Tyr His Phe Ser Ala Thr Ser Phe Asp Ser Val Asp Gly Thr  
50 55 60

Arg His Tyr Arg Val Trp Thr Ala Val Pro Asn Thr Thr Ala Pro Ala  
65 70 75 80

Ser Gly Tyr Pro Ile Leu Tyr Met Leu Asp Gly Asn Ala Val Met Asp

85

90

95

Arg Leu Asp Asp Glu Leu Leu Lys Gln Leu Ser Glu Lys Thr Pro Pro  
 100 105 110

Val Ile Val Ala Val Gly Tyr Gln Thr Asn Leu Pro Phe Asp Leu Asn  
 115 120 125

Ser Arg Ala Tyr Asp Tyr Thr Pro Ala Ala Glu Ser Arg Lys Thr Asp  
 130 135 140

Leu His Ser Gly Arg Phe Ser Arg Lys Ser Gly Gly Ser Asn Asn Phe  
 145 150 155 160

Arg Gln Leu Leu Glu Thr Arg Ile Ala Pro Lys Val Glu Gln Gly Leu  
 165 170 175

Asn Ile Asp Arg Gln Arg Arg Gly Leu Trp Gly His Ser Tyr Gly Gly  
 180 185 190

Leu Phe Val Leu Asp Ser Trp Leu Ser Ser Ser Tyr Phe Arg Ser Tyr  
 195 200 205

Tyr Ser Ala Ser Pro Ser Leu Gly Arg Gly Tyr Asp Ala Leu Leu Ser  
 210 215 220

Arg Val Thr Ala Val Glu Pro Leu Gln Phe Cys Thr Lys His Leu Ala  
 225 230 235 240

Ile Met Glu Gly Ser Ala Thr Gln Gly Asp Asn Arg Glu Thr His Ala  
 245 250 255

Val Gly Val Leu Ser Lys Ile His Thr Thr Leu Thr Ile Leu Lys Asp  
 260 265 270

Lys Gly Val Asn Ala Val Phe Trp Asp Phe Pro Asn Leu Gly His Gly  
 275 280 285

Pro Met Phe Asn Ala Ser Phe Arg Gln Ala Leu Leu Asp Ile Ser Gly  
 290 295 300

Glu Asn Ala Asn Tyr Thr Ala Gly Cys His Glu Leu Ser His  
 305 310 315

<210> 8

<211> 725

<212> PRT

<213> Escherichia coli

<400> 8

Met Arg Ile Asn Lys Ile Leu Trp Ser Leu Thr Val Leu Leu Val Gly  
1 5 10 15

Leu Asn Ser Gln Val Ser Val Ala Lys Tyr Ser Asp Asp Asp Asn Asp  
20 25 30

Glu Thr Leu Val Val Glu Ala Thr Ala Glu Gln Val Leu Lys Gln Gln  
35 40 45

Pro Gly Val Ser Val Ile Thr Ser Glu Asp Ile Lys Lys Thr Pro Pro  
50 55 60

Val Asn Asp Leu Ser Asp Ile Ile Arg Lys Met Pro Gly Val Asn Leu  
65 70 75 80

Thr Gly Asn Ser Ala Ser Gly Thr Arg Gly Asn Asn Arg Gln Ile Asp  
85 90 95

Ile Arg Gly Met Gly Pro Glu Asn Thr Leu Ile Leu Ile Asp Gly Val  
100 105 110

Pro Val Thr Ser Arg Asn Ser Val Arg Tyr Ser Trp Arg Gly Glu Arg  
115 120 125

Asp Thr Arg Gly Asp Thr Asn Trp Val Pro Pro Glu Gln Val Glu Arg  
130 135 140

Ile Glu Val Ile Arg Gly Pro Ala Ala Ala Arg Tyr Gly Ser Gly Ala  
145 150 155 160

Ala Gly Gly Val Val Asn Ile Ile Thr Lys Arg Pro Thr Asn Asp Trp  
165 170 175

His Gly Ser Leu Ser Leu Tyr Thr Asn Gln Pro Glu Ser Ser Glu Glu  
180 185 190

Gly Ala Thr Arg Arg Ala Asn Phe Ser Leu Ser Gly Pro Leu Ala Gly  
195 200 205

Asp Ala Leu Thr Thr Arg Leu Tyr Gly Asn Leu Asn Lys Thr Asp Ala  
210 215 220

Asp Ser Trp Asp Ile Asn Ser Pro Val Gly Thr Lys Asn Ala Ala Gly  
225 230 235 240

His Glu Gly Val Arg Asn Lys Asp Ile Asn Gly Val Val Ser Trp Lys  
245 250 255

Leu Asn Pro Gln Gln Ile Leu Asp Phe Glu Val Gly Tyr Ser Arg Gln  
260 265 270

Gly Asn Ile Tyr Ala Gly Asp Thr Gln Asn Ser Ser Ser Ser Ala Val  
275 280 285

Thr Glu Ser Leu Ala Lys Ser Gly Lys Glu Thr Asn Arg Leu Tyr Arg  
290 295 300

Gln Asn Tyr Gly Ile Thr His Asn Gly Ile Trp Asp Trp Gly Gln Ser  
305 310 315 320

Arg Phe Gly Val Tyr Tyr Glu Lys Thr Asn Asn Thr Arg Met Asn Glu  
325 330 335

Gly Leu Ser Gly Gly Gly Glu Gly Arg Ile Leu Ala Gly Glu Lys Phe  
340 345 350

Thr Thr Asn Arg Leu Ser Ser Trp Arg Thr Ser Gly Glu Leu Asn Ile  
355 360 365

Pro Leu Asn Val Met Val Asp Gln Thr Leu Thr Val Gly Ala Glu Trp  
370 375 380

Asn Arg Asp Lys Leu Asp Asp Pro Ser Ser Thr Ser Leu Thr Val Asn  
385 390 395 400

Asp Arg Asp Ile Ser Gly Ile Ser Gly Ser Ala Ala Asp Arg Ser Ser  
405 410 415

Lys Asn His Ser Gln Ile Ser Ala Leu Tyr Ile Glu Asp Asn Ile Glu  
420 425 430

Pro Val Pro Gly Thr Asn Ile Ile Pro Gly Leu Arg Phe Asp Tyr Leu  
435 440 445

Ser Asp Ser Gly Gly Asn Phe Ser Pro Ser Leu Asn Leu Ser Gln Glu  
450 455 460

Leu Gly Asp Tyr Phe Lys Val Lys Ala Gly Val Ala Arg Thr Phe Lys  
465 470 475 480

Ala Pro Asn Leu Tyr Gln Ser Ser Glu Gly Tyr Leu Leu Tyr Ser Lys  
485 490 495

Gly Asn Gly Cys Pro Lys Asp Ile Thr Ser Gly Gly Cys Tyr Leu Ile  
500 505 510

Gly Asn Lys Asp Leu Asp Pro Glu Ile Ser Val Asn Lys Glu Ile Gly  
515 520 525

Leu Glu Phe Thr Trp Glu Asp Tyr His Ala Ser Val Thr Tyr Phe Arg  
530 535 540

Asn Asp Tyr Gln Asn Lys Ile Val Ala Gly Asp Asn Val Ile Gly Gln  
545 550 555 560

Thr Ala Ser Gly Ala Tyr Ile Leu Lys Trp Gln Asn Gly Gly Lys Ala  
565 570 575

Leu Val Asp Gly Ile Glu Ala Ser Met Ser Phe Pro Leu Val Lys Glu  
580 585 590

Arg Leu Asn Trp Asn Thr Asn Ala Thr Trp Met Ile Thr Ser Glu Gln  
595 600 605

Lys Asp Thr Gly Asn Pro Leu Ser Val Ile Pro Lys Tyr Thr Ile Asn  
610 615 620

Asn Ser Leu Asn Trp Thr Ile Thr Gln Ala Phe Ser Ala Ser Phe Asn  
625 630 635 640

Trp Thr Leu Tyr Gly Arg Gln Lys Pro Arg Thr His Ala Glu Thr Arg

645

650

655

Ser Glu Asp Thr Gly Gly Leu Ser Gly Lys Glu Leu Gly Ala Tyr Ser  
660 665 670

Leu Val Gly Thr Asn Phe Asn Tyr Asp Ile Asn Lys Asn Leu Arg Leu  
675 680 685

Asn Val Gly Val Ser Asn Ile Leu Asn Lys Gln Ile Phe Arg Ser Ser  
690 695 700

Glu Gly Ala Asn Thr Tyr Asn Glu Pro Gly Arg Ala Tyr Tyr Ala Gly  
705 710 715 720

Val Thr Ala Ser Phe  
725

<210> 9

<211> 1014

<212> PRT

<213> Escherichia coli

<400> 9

Met Gly Asn Gln Trp Gln Gln Lys Tyr Leu Leu Glu Tyr Asn Glu Leu  
1 5 10 15

Val Ser Asn Phe Pro Ser Pro Glu Arg Val Val Ser Asp Tyr Ile Lys  
20 25 30

Asn Cys Phe Lys Thr Asp Leu Pro Trp Phe Ser Arg Ile Asp Pro Asp  
35 40 45

Asn Ala Tyr Phe Ile Cys Phe Ser Gln Asn Arg Ser Asn Ser Arg Ser  
50 55 60

Tyr Thr Gly Trp Asp His Leu Gly Lys Tyr Lys Thr Glu Val Leu Thr  
65 70 75 80

Leu Thr Gln Ala Ala Leu Ile Asn Ile Gly Tyr Arg Phe Asp Val Phe  
85 90 95

Asp Asp Ala Asn Ser Ser Thr Gly Ile Tyr Lys Thr Lys Ser Ala Asp  
100 105 110

Val Phe Asn Glu Glu Asn Glu Glu Lys Met Leu Pro Ser Glu Tyr Leu  
115 120 125

His Phe Leu Gln Lys Cys Asp Phe Ala Gly Val Tyr Gly Lys Thr Leu  
130 135 140

Ser Asp Tyr Trp Ser Lys Tyr Tyr Asp Lys Phe Lys Leu Leu Leu Lys  
145 150 155 160

Asn Tyr Tyr Ile Ser Ser Ala Leu Tyr Leu Tyr Lys Asn Gly Glu Leu  
165 170 175

Asp Glu Arg Glu Tyr Asn Phe Ser Met Asn Ala Leu Asn Arg Ser Asp  
180 185 190

Asn Ile Ser Leu Leu Phe Phe Asp Ile Tyr Gly Tyr Tyr Ala Ser Asp  
195 200 205

Ile Phe Val Ala Lys Asn Asn Asp Lys Val Met Leu Phe Ile Pro Gly  
210 215 220

Ala Lys Lys Pro Phe Leu Phe Lys Lys Asn Ile Ala Asp Leu Arg Leu  
225 230 235 240

Thr Leu Lys Glu Leu Ile Lys Asp Ser Asp Asn Lys Gln Leu Leu Ser  
245 250 255

Gln His Phe Ser Leu Tyr Ser Arg Gln Asp Gly Val Ser Tyr Ala Gly  
260 265 270

Val Asn Ser Val Leu His Ala Ile Glu Asn Asp Gly Asn Phe Asn Glu  
275 280 285

Ser Tyr Phe Leu Tyr Ser Asn Lys Thr Leu Ser Asn Lys Asp Val Phe  
290 295 300

Asp Ala Ile Ala Ile Ser Val Lys Lys Arg Ser Phe Ser Asp Gly Asp  
305 310 315 320

Ile Val Ile Lys Ser Asn Ser Glu Ala Gln Arg Asp Tyr Ala Leu Thr  
325 330 335



Ile Leu Gln Thr Ile Leu Ser Met Thr Pro Ile Phe Asp Ile Val Val  
340 345 350

Pro Glu Val Ser Val Pro Leu Gly Leu Gly Ile Ile Thr Ser Ser Met  
355 360 365

Gly Ile Ser Phe Asp Gln Leu Ile Asn Gly Asp Thr Tyr Glu Glu Arg  
370 375 380

Arg Ser Ala Ile Pro Gly Leu Ala Thr Asn Ala Val Leu Leu Gly Leu  
385 390 395 400

Ser Phe Ala Ile Pro Leu Leu Ile Ser Lys Ala Gly Ile Asn Gln Glu  
405 410 415

Val Leu Ser Ser Val Ile Asn Asn Glu Gly Arg Thr Leu Asn Glu Thr  
420 425 430

Asn Ile Asp Ile Phe Leu Lys Glu Tyr Gly Ile Ala Glu Asp Ser Ile  
435 440 445

Ser Ser Thr Asn Leu Leu Asp Val Lys Leu Lys Ser Ser Gly Gln His  
450 455 460

Val Asn Ile Val Lys Leu Ser Asp Glu Asp Asn Gln Ile Val Ala Val  
465 470 475 480

Lys Gly Ser Ser Leu Ser Gly Ile Tyr Tyr Glu Val Asp Ile Glu Thr  
485 490 495

Gly Tyr Glu Ile Leu Ser Arg Arg Ile Tyr Arg Thr Glu Tyr Asn Asn  
500 505 510

Glu Ile Leu Trp Thr Arg Gly Gly Gly Leu Lys Gly Gly Gln Pro Phe  
515 520 525

Asp Phe Glu Ser Leu Asn Ile Pro Val Phe Phe Lys Asp Glu Pro Tyr  
530 535 540

Ser Ala Val Thr Gly Ser Pro Leu Ser Phe Ile Asn Asp Asp Ser Ser  
545 550 555 560

Leu Leu Tyr Pro Asp Thr Asn Pro Lys Leu Pro Gln Pro Thr Ser Glu  
565 570 575

Met Asp Ile Val Asn Tyr Val Lys Gly Ser Gly Ser Phe Gly Asp Arg  
580 585 590

Phe Val Thr Leu Met Arg Gly Ala Thr Glu Glu Glu Ala Trp Asn Ile  
595 600 605

Ala Ser Tyr His Thr Ala Gly Gly Ser Thr Glu Glu Leu His Glu Ile  
610 615 620

Leu Leu Gly Gln Gly Pro Gln Ser Ser Leu Gly Phe Thr Glu Tyr Thr  
625 630 635 640

Ser Asn Val Asn Ser Ala Asp Ala Ala Ser Arg Arg His Phe Leu Val  
645 650 655

Val Ile Lys Val His Val Lys Tyr Ile Thr Asn Asn Asn Val Ser Tyr  
660 665 670

Val Asn His Trp Ala Ile Pro Asp Glu Ala Pro Val Glu Val Leu Ala  
675 680 685

Val Val Asp Arg Arg Phe Asn Phe Pro Glu Pro Ser Thr Pro Pro Asp  
690 695 700

Ile Ser Thr Ile Arg Lys Leu Leu Ser Leu Arg Tyr Phe Lys Glu Ser  
705 710 715 720

Ile Glu Ser Thr Ser Lys Ser Asn Phe Gln Lys Leu Ser Arg Gly Asn  
725 730 735

Ile Asp Val Leu Lys Gly Arg Gly Ser Ile Ser Ser Thr Arg Gln Arg  
740 745 750

Ala Ile Tyr Pro Tyr Phe Glu Ala Ala Asn Ala Asp Glu Gln Gln Pro  
755 760 765

Leu Phe Phe Tyr Ile Lys Lys Asp Arg Phe Asp Asn His Gly Tyr Asp  
770 775 780

Gln Tyr Phe Tyr Asp Asn Thr Val Gly Leu Asn Gly Ile Pro Thr Leu

785

790

795

800

Asn Thr Tyr Thr Gly Glu Ile Pro Ser Asp Ser Ser Ser Leu Gly Ser  
805 810 815

Thr Tyr Trp Lys Lys Tyr Asn Leu Thr Asn Glu Thr Ser Ile Ile Arg  
820 825 830

Val Ser Asn Ser Ala Arg Gly Ala Asn Gly Ile Lys Ile Ala Leu Glu  
835 840 845

Glu Val Gln Glu Gly Lys Pro Val Ile Ile Thr Ser Gly Asn Leu Ser  
850 855 860

Gly Cys Thr Thr Ile Val Ala Arg Lys Glu Gly Tyr Ile Tyr Lys Val  
865 870 875 880

His Thr Gly Thr Thr Lys Ser Leu Ala Gly Phe Thr Ser Thr Thr Gly  
885 890 895

Val Lys Lys Ala Val Glu Val Leu Glu Leu Leu Thr Lys Glu Pro Ile  
900 905 910

Pro Arg Val Glu Gly Ile Met Ser Asn Asp Phe Leu Val Asp Tyr Leu  
915 920 925

Ser Glu Asn Phe Glu Asp Ser Leu Ile Thr Tyr Ser Ser Ser Glu Lys  
930 935 940

Lys Pro Asp Ser Gln Ile Thr Ile Ile Arg Asp Asn Val Ser Val Phe  
945 950 955 960

Pro Tyr Phe Leu Asp Asn Ile Pro Glu His Gly Phe Gly Thr Ser Ala  
965 970 975

Thr Val Leu Val Arg Val Asp Gly Asn Val Val Val Arg Ser Leu Ser  
980 985 990

Glu Ser Tyr Ser Leu Asn Ala Asp Ala Ser Glu Ile Ser Val Leu Lys  
995 1000 1005

Val Phe Ser Lys Lys Phe  
1010

<210> 10  
<211> 454  
<212> PRT  
<213> Escherichia coli

<400> 10

Met Val Asp Met Ile Asn Glu Ser Ala Arg Gln Thr Pro Val Ile Ala  
1 5 10 15

Gln Thr Asp Val Leu Val Ile Gly Gly Gly Pro Ala Gly Leu Ser Ala  
20 25 30

Ala Ile Ala Ala Gly Arg Leu Gly Ala Arg Thr Met Ile Val Glu Arg  
35 40 45

Tyr Gly Ser Leu Gly Gly Val Leu Thr Gln Val Gly Val Glu Ser Phe  
50 55 60

Ala Trp Tyr Arg His Pro Gly Thr Glu Asp Cys Glu Gly Ile Cys Arg  
65 70 75 80

Glu Tyr Glu Gly Arg Ala Arg Ala Leu Gly Phe Thr Arg Pro Glu Pro  
85 90 95

Gln Ser Ile Ser Glu Val Ile Asp Thr Glu Gly Phe Lys Val Val Ala  
100 105 110

Asp Gln Met Ile Thr Glu Ser Gly Val Glu Pro Leu Tyr His Ser Trp  
115 120 125

Val Val Asp Val Ile Lys Asp Gly Asp Thr Leu Cys Gly Val Ile Val  
130 135 140

Glu Asn Lys Ser Gly Arg Gly Ala Ile Leu Ala Lys Arg Ile Val Asp  
145 150 155 160

Cys Thr Gly Asp Ala Asp Ile Ala Ala Arg Ala Gly Ala Pro Trp Thr  
165 170 175

Lys Arg Ser Lys Asp Gln Leu Met Gly Val Thr Val Met Phe Ser Cys  
180 185 190

Ala Gly Val Asp Val Ala Arg Phe Asn Arg Phe Val Ala Glu Glu Leu  
195 200 205

Lys Pro Thr Tyr Ala Asp Trp Gly Lys Asn Trp Thr Ile Gln Thr Thr  
210 215 220

Gly Lys Glu Asp Pro Met Phe Ser Pro Tyr Met Glu Asp Ile Phe Thr  
225 230 235 240

Arg Ala Gln Gln Asp Gly Val Ile Pro Gly Asp Ala Gln Ala Ile Ala  
245 250 255

Gly Thr Trp Ser Thr Phe Ser Glu Ser Gly Glu Ala Phe Gln Met Asn  
260 265 270

Met Val Tyr Ala Phe Gly Phe Asp Cys Thr Asp Val Phe Asp Leu Thr  
275 280 285

Lys Ala Glu Ile Ala Gly Arg Gln Gln Ala Leu Trp Ala Ile Asp Ala  
290 295 300

Leu Arg His Tyr Val Pro Gly Phe Glu Asn Val Arg Leu Arg Asn Phe  
305 310 315 320

Gly Ala Thr Leu Gly Thr Arg Glu Ser Arg Leu Ile Glu Gly Glu Ile  
325 330 335

Arg Ile Ala Asp Asp Tyr Val Leu Asn Gln Gly Arg Cys Ser Asp Ser  
340 345 350

Val Gly Ile Phe Pro Glu Phe Ile Asp Gly Ser Gly Tyr Leu Ile Leu  
355 360 365

Pro Thr Thr Gly Arg Phe Phe Gln Ile Pro Tyr Gly Cys Leu Val Pro  
370 375 380

Gln Lys Val Glu Asn Leu Leu Val Ala Gly Arg Cys Ile Ser Ala Gly  
385 390 395 400

Val Val Ala His Thr Ser Met Arg Asn Met Met Cys Cys Ala Val Thr  
405 410 415

Gly Glu Ala Ala Gly Thr Ala Ala Val Val Ser Leu Gln Gln Asn Cys

420

425

430

Thr Val Arg Gln Val Ala Ile Pro Asp Leu Gln Asn Thr Leu Gln Gln  
 435 440 445

Gln Gly Val Arg Leu Ala  
 450

<210> 11  
 <211> 253  
 <212> PRT

<213> Escherichia coli

<400> 11

Met Ser Ala Lys Arg Arg Leu Leu Ile Ala Cys Thr Leu Ile Thr Ala  
 1 5 10 15

Ile Tyr His Phe Pro Ala Tyr Ser Ser Leu Glu Tyr Lys Gly Thr Phe  
 20 25 30

Gly Ser Ile Asn Ala Gly Tyr Ala Asp Trp Asn Ser Gly Phe Val Asn  
 35 40 45

Thr His Arg Gly Glu Val Trp Lys Val Thr Ala Asp Phe Gly Val Asn  
 50 55 60

Phe Lys Glu Ala Glu Phe Tyr Ser Phe Tyr Glu Ser Asn Val Leu Asn  
 65 70 75 80

His Ala Val Ala Gly Arg Asn His Thr Val Ser Ala Met Thr His Val  
 85 90 95

Arg Leu Phe Asp Ser Asp Met Thr Phe Phe Gly Lys Ile Tyr Gly Gln  
 100 105 110

Trp Asp Asn Ser Trp Gly Asp Asp Leu Asp Met Phe Tyr Gly Phe Gly  
 115 120 125

Tyr Leu Gly Trp Asn Gly Glu Trp Gly Phe Phe Lys Pro Tyr Ile Gly  
 130 135 140

Leu His Asn Gln Ser Gly Asp Tyr Val Ser Ala Lys Tyr Gly Gln Thr  
 145 150 155 160

Asn Gly Trp Asn Gly Tyr Val Val Gly Trp Thr Ala Val Leu Pro Phe  
165 170 175

Thr Leu Phe Asp Glu Lys Phe Val Leu Ser Asn Trp Asn Glu Ile Glu  
180 185 190

Leu Asp Arg Asn Asp Ala Tyr Thr Glu Gln Gln Phe Gly Arg Asn Gly  
195 200 205

Leu Asn Gly Gly Leu Thr Ile Ala Trp Lys Phe Tyr Pro Arg Trp Lys  
210 215 220

Ala Ser Val Thr Trp Arg Tyr Phe Asp Asn Lys Leu Gly Tyr Asp Gly  
225 230 235 240

Phe Gly Asp Gln Met Ile Tyr Met Leu Gly Tyr Asp Phe  
245 250

<210> 12  
<211> 492  
<212> PRT

<213> Escherichia coli

<400> 12

Met Ala Ser Leu Ile Gly Leu Ala Val Cys Thr Gly Asn Ala Phe Ser  
1 5 10 15

Pro Ala Leu Ala Ala Glu Ala Lys Gln Pro Asn Leu Val Ile Ile Met  
20 25 30

Ala Asp Asp Leu Gly Tyr Gly Asp Leu Ala Thr Tyr Gly His Gln Ile  
35 40 45

Val Lys Thr Pro Asn Ile Asp Arg Leu Ala Gln Glu Gly Val Lys Phe  
50 55 60

Thr Asp Tyr Tyr Ala Pro Ala Pro Leu Ser Ser Pro Ser Arg Ala Gly  
65 70 75 80

Leu Leu Thr Gly Arg Met Pro Phe Arg Thr Gly Ile Arg Ser Trp Ile  
85 90 95

Pro Ser Gly Lys Asp Val Ala Leu Gly Arg Asn Glu Leu Thr Ile Ala  
100 105 110

Asn Leu Leu Lys Ala Gln Gly Tyr Asp Thr Ala Met Met Gly Lys Leu  
115 120 125

His Leu Asn Ala Gly Gly Asp Arg Thr Asp Gln Pro Gln Ala Gln Asp  
130 135 140

Met Gly Phe Asp Tyr Ser Leu Ala Asn Thr Ala Gly Phe Val Thr Asp  
145 150 155 160

Ala Thr Leu Asp Asn Ala Lys Glu Arg Pro Arg Tyr Gly Met Val Tyr  
165 170 175

Pro Thr Gly Trp Leu Arg Asn Gly Gln Pro Thr Pro Arg Ala Asp Lys  
180 185 190

Met Ser Gly Glu Tyr Val Ser Ser Glu Val Val Asn Trp Leu Asp Asn  
195 200 205

Lys Lys Asp Ser Lys Pro Phe Phe Leu Tyr Val Ala Phe Thr Glu Val  
210 215 220

His Ser Pro Leu Ala Ser Pro Lys Lys Tyr Leu Asp Met Tyr Ser Gln  
225 230 235 240

Tyr Met Ser Ala Tyr Gln Lys Gln His Pro Asp Leu Phe Tyr Gly Asp  
245 250 255

Trp Ala Asp Lys Pro Trp Arg Gly Val Gly Glu Tyr Tyr Ala Asn Ile  
260 265 270

Ser Tyr Leu Asp Ala Gln Val Gly Lys Val Leu Asp Lys Ile Lys Ala  
275 280 285

Met Gly Glu Glu Asp Asn Thr Ile Val Ile Phe Thr Ser Asp Asn Gly  
290 295 300

Pro Val Thr Arg Glu Ala Arg Lys Val Tyr Glu Leu Asn Leu Ala Gly  
305 310 315 320



Glu Thr Asp Gly Leu Arg Gly Arg Lys Asp Asn Leu Trp Glu Gly Gly  
325 330 335

Ile Arg Val Pro Ala Ile Ile Lys Tyr Gly Lys His Leu Pro Gln Gly  
340 345 350

Met Val Ser Asp Thr Pro Val Tyr Gly Leu Asp Trp Met Pro Thr Leu  
355 360 365

Ala Lys Met Met Asn Phe Lys Leu Pro Thr Asp Arg Thr Phe Asp Gly  
370 375 380

Glu Ser Leu Val Pro Val Leu Glu Gln Lys Ala Leu Lys Arg Glu Lys  
385 390 395 400

Pro Leu Ile Phe Gly Ile Asp Met Pro Phe Gln Asp Asp Pro Thr Asp  
405 410 415

Glu Trp Ala Ile Arg Asp Gly Asp Trp Lys Met Ile Ile Asp Arg Asn  
420 425 430

Asn Lys Pro Lys Tyr Leu Tyr Asn Leu Lys Ser Asp Arg Tyr Glu Thr  
435 440 445

Leu Asn Leu Ile Gly Lys Lys Pro Asp Ile Glu Lys Gln Met Tyr Gly  
450 455 460

Lys Phe Leu Lys Tyr Lys Thr Asp Ile Asp Asn Asp Ser Leu Met Lys  
465 470 475 480

Ala Arg Gly Asp Lys Pro Glu Ala Val Thr Trp Gly  
485 490

<210> 13

<211> 345

<212> PRT

<213> Escherichia coli

<400> 13

Leu Ile Ser Leu Ser Phe Ile Pro Val Met Ser Ala Leu Pro Gly Pro  
1 5 10 15

Ile Ala Lys Gly Phe Arg Asn Glu Arg Gly Phe Val Thr Thr Thr Ile  
20 25 30

Cys Ala Met Gly Glu Leu Leu Ala Glu Phe Leu Ser Arg Asn Pro His  
35 40 45

Gln Lys Phe Thr Gln Pro Gly Glu Phe Ile Gly Pro Phe Pro Ser Gly  
50 55 60

Ala Pro Ala Ile Phe Ala Ala Gln Val Ala Lys Leu Ser His Arg Ala  
65 70 75 80

Ile Phe Phe Gly Cys Val Gly Asn Asp Asp Phe Ala Arg Leu Ile Ile  
85 90 95

Glu Arg Leu Arg His Glu Gly Val Ile Thr Asp Gly Ile His Val Met  
100 105 110

Asn Asn Ala Val Thr Gly Thr Ala Phe Val Ser Tyr Gln Asn Pro Gln  
115 120 125

Gln Arg Asp Phe Val Phe Asn Ile Pro Asn Ser Ala Cys Gly Leu Phe  
130 135 140

Thr Ala Glu His Ile Asp Lys Asp Leu Leu Lys Gln Cys Asn His Leu  
145 150 155 160

His Ile Val Gly Ser Ser Leu Phe Ser Phe Arg Met Ile Asp Val Met  
165 170 175

Arg Lys Ala Ile Thr Thr Ile Lys Ser Ala Gly Gly Thr Val Ser Phe  
180 185 190

Asp Pro Asn Ile Arg Lys Glu Met Leu Ser Ile Pro Glu Met Ala Gln  
195 200 205

Ala Leu Asp Tyr Leu Ile Glu Tyr Thr Asp Ile Phe Ile Pro Ser Glu  
210 215 220

Ser Glu Leu Pro Phe Phe Ala Arg His Lys Asn Leu Ser Glu Glu Gln  
225 230 235 240

Ile Val Ser Asp Leu Leu His Gly Gly Val Lys His Val Ala Ile Lys

245

250

255

Arg Ala Gln Arg Gly Ala Ser Tyr Tyr Lys Leu Lys Asn Gly Thr Leu  
 260 265 270

His Ala Gln His Val Ala Gly His Asp Ile Glu Ile Ile Asp Pro Thr  
 275 280 285

Gly Ala Gly Asp Cys Phe Gly Ala Thr Phe Ile Thr Leu Phe Leu Ser  
 290 295 300

Gly Phe Pro Ala His Lys Ala Leu Gln Tyr Ala Asn Ala Ser Gly Ala  
 305 310 315 320

Leu Ala Val Met Arg Gln Gly Pro Met Glu Gly Ile Ser Ser Leu Ala  
 325 330 335

Asp Ile Glu Asp Phe Leu Gln Gln His  
 340 345

<210> 14  
 <211> 192  
 <212> PRT

<213> Escherichia coli

<400> 14

Met Tyr Met Pro Gly Lys Gln Met Leu Cys Cys Ile Leu Ile Ser Ile  
 1 5 10 15

Ile Ser Glu Gly Asp Met Lys Ile Phe Ile Ser Leu Phe Leu Phe Ile  
 20 25 30

Ile Ser Thr Asn Ser Phe Ala Asp Asp Ile Thr His Ala Gly Val Val  
 35 40 45

Arg Ile Glu Gly Leu Ile Thr Glu Lys Thr Cys Ile Ile Ser Asp Glu  
 50 55 60

Ser Lys Asn Phe Thr Val Asn Met Pro Asp Val Pro Ser Ser Ser Val  
 65 70 75 80

Arg Ser Ala Gly Asp Val Thr Glu Lys Val Tyr Phe Ser Ile Thr Leu  
 85 90 95

Thr Arg Cys Gly Ser Asp Val Gly Asn Ala Tyr Ile Lys Phe Thr Gly  
100 105 110

Asn Thr Val Ser Glu Asp Ala Ser Leu Tyr Lys Leu Glu Asp Gly Ser  
115 120 125

Val Glu Gly Leu Ala Leu Thr Ile Phe Asp Lys Asn Lys Gly Ser Ile  
130 135 140

Ser Asn Asp Val Lys Ser Met Val Phe Ser Leu Thr Ser Ser Val Asp  
145 150 155 160

Asn Ile Leu His Phe Phe Ala Ala Tyr Lys Ala Leu Lys Asn Asn Val  
165 170 175

Gln Pro Gly Asp Ala Asn Ala Ser Val Ser Phe Ile Val Thr Tyr Asp  
180 185 190

<210> 15  
<211> 201  
<212> PRT

<213> Escherichia coli

<400> 15

Met Ile Lys Phe Arg Leu Tyr Ile Pro Pro Val Ile Leu Gly Phe Val  
1 5 10 15

Ile Val Pro Leu Leu Val Trp Pro Thr Val Ile Ala Leu Ala Val Leu  
20 25 30

Ile Phe Thr Leu Thr Phe Leu Ala Glu Ile Ile Phe Ser Phe Pro Leu  
35 40 45

Leu Val Val Arg Ile Ser Leu Gln Glu Leu Gln Leu Glu Leu Leu Val  
50 55 60

Val Tyr Ala Leu Phe Phe Ser Val Met Gly Gly Ile Gly Trp Gln Phe  
65 70 75 80

Ser Arg Arg Thr Pro Pro Glu Leu Lys Asn Arg Leu His Cys Trp Leu  
85 90 95

Val Phe Ser Pro Val Tyr Phe Trp Leu Ile Leu Ser Asn Phe Ile Leu  
100 105 110

Tyr Ile Ser Pro Glu Lys Ser Ala Leu Leu Glu Asn Ile Arg Asn Phe  
115 120 125

Phe Leu Thr Phe Val Trp Leu Pro Leu Asn Phe Ser Pro Phe Trp Pro  
130 135 140

Gln Pro Trp Thr Asp Phe Val Gly Pro Ile Ser Ala Gln Leu Gly Phe  
145 150 155 160

Ala Leu Gly Tyr Tyr Cys Gln Trp Arg Ser Lys Asn Arg Ser His Arg  
165 170 175

Lys Lys Trp Gly Asp Trp Val Thr Cys Leu Ser Leu Ala Ile Leu Ala  
180 185 190

Leu Gly Pro Leu Phe Asn Tyr Leu Gln  
195 200

<210> 16

<211> 234

<212> PRT

<213> Escherichia coli

<400> 16

Met Lys Phe Asn Leu Ser Asn Leu Ser Ala Val Leu Leu Ala Ser Gly  
1 5 10 15

Met Leu Met Ser Thr Ala Val Thr Ala Ala Pro Gly Asp Ala Thr Gln  
20 25 30

Phe Gly Gly Ala Asp Thr Asp Trp Ser Thr Val Asp Tyr Pro Arg Leu  
35 40 45

Thr Asp Met Asp Asp Asn Val Asp Ser Met Gly Gly Lys Ile Arg Phe  
50 55 60

Thr Gly Arg Val Val Lys Ala Thr Cys Lys Val Ala Thr Asp Ser Lys  
65 70 75 80

Gln Ile Glu Val Val Leu Pro Val Val Pro Ser Asn Leu Phe Thr Gly  
85 90 95

Ile Asp Val Glu Ala Gln Gly Ala Ser Asn Gln Thr Asp Phe Asn Ile  
100 105 110

Asn Leu Thr Glu Cys Ser Asn Thr Asp Asp Gln Lys Ile Glu Phe Arg  
115 120 125

Phe Thr Gly Thr Ala Asp Ser Ala Asn Lys Thr Leu Ala Asn Glu Val  
130 135 140

Glu Gly Ser Thr Asp Ala Asp Asn Ser Gly Asn Ala Gly Ala Thr Gly  
145 150 155 160

Val Gly Ile Arg Ile Tyr Ser Lys Gly Thr Thr Asn Asn Gly Leu Ile  
165 170 175

Asn Leu Asn Thr Thr Ala Ala Glu Gly Ser Ala Ser Thr Ala Ala Tyr  
180 185 190

Thr Ile Pro Gly Asn Ala Thr Thr His Asp Phe Ser Ala Ala Phe Thr  
195 200 205

Ala Gly Tyr Ala Gln Asn Gly Ser Thr Val Ala Pro Gly Val Val Lys  
210 215 220

Ser Thr Ala Ser Phe Val Val Leu Tyr Glu  
225 230

<210> 17  
<211> 336  
<212> PRT

<213> Escherichia coli

<400> 17

Met Arg Ile His Thr Tyr Trp Tyr Arg Arg Tyr Phe Ile Leu Leu Ile  
1 5 10 15

Ile Ile Phe Ser Asn Val Leu Ser Ser Ile Ala Asn Ala Glu Asp Met  
20 25 30

Gly Arg Glu Arg Ala Tyr Cys Tyr Pro Gly Ser Pro Ser Asn Asn Thr  
35 40 45

Thr Pro Ala Ser Phe Ser Tyr Asn Phe Gly Thr Ile Val Val Ser Asp  
50 55 60

Val Asn Lys Asn Ala Pro Gly Thr Val Leu Pro Ser Gln Ile Trp Lys  
65 70 75 80

Val Gly Thr Tyr Lys Ala Tyr Cys Asn Ser Leu Asp Asp Tyr Glu Ile  
85 90 95

Tyr Phe Ser Ala Val Ser Gly Ile Asp Pro Ser Gly Ala Ser Gly Asp  
100 105 110

His Gln Gly Ser Asp Val Phe Ile Pro Leu Thr His Glu Ile Ser Val  
115 120 125

Ser Thr His Ile Lys Leu Tyr Asn Gln Asn Gly Thr Met Thr Asp Lys  
130 135 140

Ile Val Pro Phe Glu Asn Tyr Asn Thr Asn Tyr Pro Gly Asp Arg Ser  
145 150 155 160

Lys Pro Ser Asn Trp Ala Ser Gly Thr Glu Gly Tyr Ile Lys Ile Arg  
165 170 175

Ile Asp Lys Lys Ile Ile Ser Asp Val Ser Leu Ser Asn Val Leu Leu  
180 185 190

Val Ser Leu Tyr Val Ser Gln Ile Pro Thr Glu His Gly Pro Ile Pro  
195 200 205

Val Phe Asn Ala Tyr Ile Gly Asn Leu Asn Ile Gln Val Pro Gln Gly  
210 215 220

Cys Thr Ile Asn Glu Gly Thr Ser Phe Thr Val Asn Met Pro Asp Val  
225 230 235 240

Trp Ala Ser Glu Leu Ser Arg Ala Gly Ala Gly Ala Lys Pro Ala Gly  
245 250 255

Val Thr Pro Val Ala Thr Thr Ile Pro Ile Asn Cys Thr Asn Lys Asp  
260 265 270

Thr Asp Ala Val Met Thr Leu Val Phe Asp Gly Asn Ile Ser Ala Thr  
275 280 285

Arg Asp Thr Asn Gly Lys Gln Ser Ile Ile Gln Ala Gln Asp Asn Pro  
290 295 300

Asp Val Gly Ile Met Ile Met Asp Ser Gln Gln Asn Ser Val Asp Leu  
305 310 315 320

Asn Ala Leu Ala Thr Ser Val Gly Val Pro Phe Arg Leu Val Glu Asn  
325 330 335

<210> 18

211> 864

<212> PRT

<213> Escherichia coli

<400> 18

Met Asn Leu Lys Leu Lys Arg Cys Glu Tyr Trp Met Ala Ala Gln Lys  
1 5 10 15

Gln Met Lys Arg Val Val Pro Leu Leu Leu Val Ile Met Pro Ala Cys  
20 25 30

Ser Ile Ala Gly Met Arg Phe Asn Pro Ala Phe Leu Ser Gly Asp Thr  
35 40 45

Glu Ala Val Ala Asp Leu Ser Arg Phe Glu Lys Gly Met Thr Tyr Leu  
50 55 60

Pro Gly Ser Tyr Glu Val Glu Val Trp Val Asn Asp Ser Pro Leu Leu  
65 70 75 80

Ser Arg Thr Val Thr Phe Lys Ala Asp Asp Glu Asn Gln Leu Ile Pro  
85 90 95

Cys Leu Ser Leu Ala Asp Leu Leu Ser Leu Gly Ile Asn Lys Asn Ala  
100 105 110

Leu Pro Glu Gln Ala Leu Ala Ser Ser Glu Asn Ser Cys Leu Asp Leu



115

120

125

Arg Ile Trp Phe Pro Asp Val His Tyr Met Pro Glu Leu Asp Ala Gln  
130 135 140

Arg Leu Lys Leu Thr Phe Pro Gln Ala Ile Ile Lys Arg Asp Ala Arg  
145 150 155 160

Gly Tyr Ile Pro Pro Glu Gln Trp Asp Asn Gly Ile Thr Ala Phe Leu  
165 170 175

Leu Asn Tyr Asp Phe Ser Gly Asn Asn Asp Arg Gly Asp Tyr Ser Ser  
180 185 190

Asn Asn Tyr Tyr Leu Asn Leu Arg Ala Gly Ile Asn Ile Gly Ala Trp  
195 200 205

Arg Phe Arg Asp Tyr Ser Thr Trp Ser Arg Gly Ser Asn Ser Ala Gly  
210 215 220

Lys Leu Glu His Ile Ser Ser Thr Leu Gln Arg Val Ile Ile Pro Phe  
225 230 235 240

Arg Ser Glu Leu Thr Leu Gly Asp Thr Trp Ser Ser Ser Asp Val Phe  
245 250 255

Asp Ser Val Ser Ile Arg Gly Ile Lys Leu Glu Ser Asp Glu Asn Met  
260 265 270

Leu Pro Asp Ser Gln Ser Gly Phe Ala Pro Thr Val Arg Gly Ile Ala  
275 280 285

Lys Ser Arg Ala Gln Val Thr Ile Lys Gln Asn Gly Tyr Val Ile Tyr  
290 295 300

Gln Thr Tyr Met Pro Pro Gly Pro Phe Glu Ile Ser Asp Leu Asn Pro  
305 310 315 320

Thr Ser Ser Ala Gly Asp Leu Glu Val Thr Ile Lys Glu Ser Asp Asn  
325 330 335

Ser Glu Thr Val Tyr Thr Val Pro Tyr Ala Ala Val Pro Ile Leu Gln  
340 345 350

Arg Glu Gly His Leu Lys Tyr Ser Thr Thr Val Gly Gln Tyr Arg Ser  
355 360 365

Asn Ser Tyr Asn Gln Lys Ser Pro Tyr Val Phe Gln Gly Glu Leu Ile  
370 375 380

Trp Gly Leu Pro Trp Asp Ile Thr Ala Tyr Gly Gly Ala Gln Phe Ser  
385 390 395 400

Glu Asp Tyr Arg Ala Leu Ala Leu Gly Leu Gly Leu Asn Leu Gly Val  
405 410 415

Phe Gly Ala Thr Ser Phe Asp Val Thr Gln Ala Asn Ser Ser Leu Val  
420 425 430

Asp Gly Ser Lys His Gln Gly Gln Ser Tyr Arg Phe Leu Tyr Ser Lys  
435 440 445

Ser Leu Val Gln Thr Gly Thr Ala Phe His Ile Ile Gly Tyr Arg Tyr  
450 455 460

Ser Thr Gln Gly Phe Tyr Thr Leu Ser Asp Thr Thr Tyr Gln Gln Met  
465 470 475 480

Ser Gly Thr Val Val Asp Pro Lys Thr Leu Asp Asp Lys Asp Tyr Val  
485 490 495

Tyr Asn Trp Asn Asp Phe Tyr Asn Leu Arg Tyr Ser Lys Arg Gly Lys  
500 505 510

Phe Gln Ala Ser Val Ser Gln Pro Phe Gly Asn Tyr Gly Ser Met Tyr  
515 520 525

Leu Ser Ala Ser Gln Gln Thr Tyr Trp Asn Thr Asp Lys Lys Asp Ser  
530 535 540

Leu Tyr Gln Val Gly Tyr Asn Thr Ser Ile Lys Gly Ile Tyr Leu Asn  
545 550 555 560

Val Ala Trp Asn Tyr Ser Lys Ser Pro Gly Thr Asn Ala Asp Lys Ile  
565 570 575

Val Ser Leu Asn Val Ser Leu Pro Ile Ser Asn Trp Leu Ser Ser Thr  
580 585 590

Asn Asp Gly Arg Ser Ser Ser Asn Ala Met Thr Ala Thr Tyr Gly Tyr  
595 600 605

Ser Gln Asp Asn His Gly Gln Val Asn Gln Tyr Thr Gly Val Ser Gly  
610 615 620

Ser Leu Leu Glu Gln His Asn Leu Ser Tyr Asn Ile Gln His Gly Phe  
625 630 635 640

Ala Asn Gln Asp Asn Ser Ser Ser Gly Ser Val Gly Val Asn Tyr Arg  
645 650 655

Gly Ala Tyr Gly Ser Leu Asn Ser Ala Tyr Ser Tyr Asp Asn Glu Gly  
660 665 670

Asn Gln Gln Ile Asn Tyr Gly Ile Ser Gly Ala Leu Val Val His Glu  
675 680 685

Asn Gly Leu Thr Leu Ser Gln Pro Leu Gly Glu Thr Asn Val Leu Ile  
690 695 700

Lys Ala Pro Gly Ala Asn Asn Val Asp Val Gln Arg Gly Thr Gly Ile  
705 710 715 720

Ser Thr Asp Trp Arg Gly Tyr Ala Val Val Pro Tyr Ala Thr Glu Tyr  
725 730 735

Arg Arg Asn Asn Ile Ser Leu Asp Pro Met Ser Met Asn Met His Thr  
740 745 750

Glu Leu Asp Ile Thr Ser Thr Glu Val Ile Pro Gly Lys Gly Ala Leu  
755 760 765

Val Arg Ala Glu Phe Ala Ala His Ile Gly Ile Arg Gly Leu Phe Thr  
770 775 780

Val Arg Tyr Arg Asn Lys Ser Val Pro Phe Gly Ala Thr Ala Ser Ala  
785 790 795 800

Gln Ile Lys Asn Ser Ser Gln Ile Thr Gly Ile Val Gly Asp Asn Gly  
805 810 815

Gln Leu Tyr Leu Ser Gly Leu Pro Leu Glu Gly Val Ile Asn Ile Gln  
820 825 830

Trp Gly Asp Gly Val Gln Gln Lys Cys Gln Ala Asn Tyr Lys Leu Pro  
835 840 845

Glu Thr Glu Leu Asp Asn Pro Val Ser Tyr Ala Thr Leu Glu Cys Arg  
850 855 860

<210> 19

<211> 169

<212> PRT

<213> Escherichia coli

<400> 19

Met Gly Ala Ile Tyr Val Lys Arg Leu Ile Leu Ser Val Ala Leu Ile  
1 5 10 15

Ile Pro Ile Ala Ser Asn Ala Ser Asp Ala Leu Asn Gln Pro Ser Ser  
20 25 30

Ser Leu Asn Asp Gly Val Glu Thr Phe Phe Ile Ser Cys Phe Asp Met  
35 40 45

Pro Gln Glu Thr Thr Thr Asp Met Asp Ala Cys Gln Arg Val Gln Leu  
50 55 60

Ala Gln Val Ser Trp Val Lys Asn Lys Tyr Ser Val Ala Ala Leu Asn  
65 70 75 80

Arg Leu Lys Gln Asp Asn Lys Asp Asp Pro Gln Arg Leu Gln Glu Leu  
85 90 95

Thr Ala Ser Phe Asn Ala Glu Ser Glu Ala Trp Thr Glu Leu Ile Glu  
100 105 110

Lys Ala Ser Lys Ser Val Gln Val Asp Tyr Val Gly Gly Thr Ile Ala  
115 120 125

Gly Thr Ala Val Ala Ser Arg Gln Ile Gly Leu Leu Glu Leu Gln Ser  
130 135 140

His Asp Ile Trp Glu His Trp Leu Arg Ser Arg Gly Leu Asn Ser Ser  
145 150 155 160

Ser Phe Ala Arg Thr Lys Val Gln Ile  
165

<210> 20  
<211> 713  
<212> PRT

<213> Escherichia coli

<400> 20

Met Ala Met Phe Thr Pro Ser Phe Ser Gly Leu Lys Gly Arg Ala Leu  
1 5 10 15

Phe Ser Leu Leu Phe Ala Ala Pro Met Ile His Ala Thr Asp Ser Val  
20 25 30

Thr Thr Lys Asp Gly Glu Thr Ile Thr Val Thr Ala Asp Ala Asn Thr  
35 40 45

Ala Thr Glu Ala Thr Asp Gly Tyr Gln Pro Leu Ser Thr Ser Thr Ala  
50 55 60

Thr Leu Thr Asp Met Pro Met Leu Asp Ile Pro Gln Val Val Asn Thr  
65 70 75 80

Val Ser Asp Gln Val Leu Glu Asn Gln Asn Ala Thr Thr Leu Asp Glu  
85 90 95

Ala Leu Tyr Asn Val Ser Asn Val Val Gln Thr Asn Thr Leu Gly Gly  
100 105 110

Thr Gln Asp Ala Phe Val Arg Arg Gly Phe Gly Ala Asn Arg Asp Gly  
115 120 125

Ser Ile Met Thr Asn Gly Leu Arg Thr Val Leu Pro Arg Ser Phe Asn  
130 135 140

Ala Ala Thr Glu Arg Val Glu Val Leu Lys Gly Pro Ala Ser Thr Leu  
145 150 155 160

Tyr Gly Ile Leu Asp Pro Gly Gly Leu Ile Asn Val Val Thr Lys Arg  
165 170 175

Pro Glu Lys Thr Phe His Gly Ser Val Ser Ala Thr Ser Ser Ser Phe  
180 185 190

Gly Gly Gly Thr Gly Gln Leu Asp Ile Thr Gly Pro Ile Glu Gly Thr  
195 200 205

Gln Leu Ala Tyr Arg Leu Thr Gly Glu Val Gln Asp Glu Asp Tyr Trp  
210 215 220

Arg Asn Phe Gly Lys Glu Arg Ser Thr Phe Ile Ala Pro Ser Leu Thr  
225 230 235 240

Trp Phe Gly Asp Asn Ala Thr Val Thr Met Leu Tyr Ser His Arg Asp  
245 250 255

Tyr Lys Thr Pro Phe Asp Arg Gly Thr Ile Phe Asp Leu Thr Thr Lys  
260 265 270

Gln Pro Val Asn Val Asp Arg Lys Ile Arg Phe Asp Glu Pro Phe Asn  
275 280 285

Ile Thr Asp Gly Gln Ser Asp Leu Ala Gln Leu Asn Ala Glu Tyr His  
290 295 300

Leu Asn Ser Gln Trp Thr Ala Arg Phe Asp Tyr Ser Tyr Ser Gln Asp  
305 310 315 320

Lys Tyr Ser Asp Asn Gln Ala Arg Val Thr Ala Tyr Asp Ala Thr Thr  
325 330 335

Gly Thr Leu Thr Arg Arg Val Asp Ala Thr Gln Gly Ser Thr Gln Arg  
340 345 350

Met His Ala Thr Arg Ala Asp Leu Gln Gly Asn Val Asp Ile Ala Gly  
355 360 365

Phe Tyr Asn Glu Ile Leu Gly Gly Val Ser Tyr Glu Tyr Tyr Asp Leu

370

375

380

Leu Arg Thr Asp Met Ile Arg Cys Lys Lys Ala Lys Asp Phe Asn Ile  
385 390 395 400

Tyr Asn Pro Val Tyr Gly Asn Thr Ser Lys Cys Thr Thr Val Ser Ala  
405 410 415

Ser Asp Ser Asp Gln Thr Ile Lys Gln Glu Asn Tyr Ser Ala Tyr Ala  
420 425 430

Gln Asp Ala Leu Tyr Leu Thr Asp Asn Trp Ile Ala Val Ala Gly Ile  
435 440 445

Arg Tyr Gln Tyr Tyr Thr Gln Tyr Ala Gly Lys Gly Arg Pro Phe Asn  
450 455 460

Val Asn Thr Asp Ser Arg Asp Glu Gln Trp Thr Pro Lys Leu Gly Leu  
465 470 475 480

Val Tyr Lys Leu Thr Pro Ser Val Ser Leu Phe Ala Asn Tyr Ser Gln  
485 490 495

Thr Phe Met Pro Gln Ser Ser Ile Ala Ser Tyr Ile Gly Asp Leu Pro  
500 505 510

Pro Glu Ser Ser Asn Ala Tyr Glu Val Gly Ala Lys Phe Glu Leu Phe  
515 520 525

Asp Gly Ile Thr Ala Asp Ile Ala Leu Phe Asp Ile His Lys Arg Asn  
530 535 540

Val Leu Tyr Thr Glu Ser Ile Gly Asp Glu Thr Ile Ala Lys Thr Ala  
545 550 555 560

Gly Arg Val Arg Ser Arg Gly Val Glu Val Asp Leu Ala Gly Ala Leu  
565 570 575

Thr Glu Asn Ile Asn Ile Ile Ala Ser Tyr Gly Tyr Thr Asp Ala Lys  
580 585 590

Val Leu Glu Asp Pro Asp Tyr Ala Gly Lys Pro Leu Pro Asn Val Pro  
595 600 605

Arg His Thr Gly Ser Leu Phe Leu Thr Tyr Asp Ile His Asn Met Pro  
610 615 620

Gly Asn Asn Thr Leu Thr Phe Gly Gly Gly Gly His Gly Val Ser Arg  
625 630 635 640

Arg Ser Ala Thr Asn Gly Ala Asp Tyr Tyr Leu Pro Gly Tyr Phe Val  
645 650 655

Ala Asp Ala Phe Ala Ala Tyr Lys Met Lys Leu Gln Tyr Pro Val Thr  
660 665 670

Leu Gln Leu Asn Val Lys Asn Leu Phe Asp Lys Thr Tyr Tyr Thr Ser  
675 680 685

Ser Ile Ala Thr Asn Asn Leu Gly Asn Gln Ile Gly Asp Pro Arg Glu  
690 695 700

Val Gln Phe Thr Val Lys Met Glu Phe  
705 710

<210> 21  
<211> 606  
<212> PRT

<213> Escherichia coli

<400> 21

Met Lys Ile Ser Trp Asn Tyr Ile Phe Lys Asn Lys Trp Arg Phe His  
1 5 10 15

Ile Thr Ser Ile Ser Leu Phe Leu Ile Met Leu Ala Val Ser Ile Ala  
20 25 30

Phe Leu His Leu Arg Phe Asn Thr Leu Ser Ser Thr Asp Lys Met Arg  
35 40 45

Leu Glu Met Tyr Lys Ser Thr Leu Tyr Ser Thr Ile Glu Gln Phe Tyr  
50 55 60

Val Leu Pro Tyr Met Leu Ser Thr Asp His Ile Ile Arg Gln Ala Val  
65 70 75 80



Ile Thr Pro Asp Asp Met Thr Ser Ser Glu Leu Asn Gln Arg Ile Ala  
85 90 95

His Phe Asn Thr Gln Leu Lys Thr Ala Ala Ile Phe Ile Leu Asp Thr  
100 105 110

Gln Gly Lys Ala Ile Ala Ser Ser Asn Trp Gln Asp Pro Gly Ser Tyr  
115 120 125

Val Gly Gln Asn Tyr Ser Tyr Arg Pro Tyr Tyr Lys His Ala Met Ser  
130 135 140

Gly Leu Asn Gly Arg Phe Tyr Gly Ile Gly Ser Thr Thr Asn Thr Pro  
145 150 155 160

Gly Phe Phe Leu Ser Thr Ser Ile Lys Asp Lys Gly Lys Ile Val Gly  
165 170 175

Val Val Val Val Lys Ile Ser Leu Asn Glu Ile Glu Lys Ala Trp Ala  
180 185 190

Glu Gly Pro Glu Asn Ile Ile Val Asn Asp Glu His Gly Ile Ile Phe  
195 200 205

Leu Ser Ser Lys Ser Pro Trp Arg Met Arg Thr Leu Gln Pro Leu Pro  
210 215 220

Val Gln Ala Lys Gln Lys Leu Gln Ser Thr Arg Gln Tyr Ser Leu Asp  
225 230 235 240

Asn Leu Leu Pro Ala Asp Tyr Tyr Pro Cys Tyr Thr Val Ser Asn Phe  
245 250 255

Thr Phe Leu Lys Asp Lys Lys Glu Gln Leu Cys Leu Phe Pro Gln Tyr  
260 265 270

Tyr Thr Gln Gln Ile Ala Ile Pro Glu Phe Asn Trp Lys Met Thr Ile  
275 280 285

Met Val Pro Leu Asp Asn Leu Tyr Trp Ser Trp Ala Ile Ser Leu Val  
290 295 300

Ile Thr Leu Ile Ile Tyr Leu Leu Phe Leu Leu Phe Ile Lys Tyr Trp  
305 310 315 320

Arg Met Arg Ser His Ala Gln Gln Leu Leu Thr Leu Ala Asn Glu Thr  
325 330 335

Leu Glu Lys Gln Val Lys Glu Arg Thr Ser Ala Leu Glu Leu Ile Asn  
340 345 350

Gln Lys Leu Ile Gln Glu Ile Lys Glu Arg Ser Gln Ala Glu Gln Val  
355 360 365

Leu Gln Ile Thr Arg Ser Glu Leu Ala Glu Ser Ser Lys Leu Ala Ala  
370 375 380

Leu Gly Gln Met Ala Thr Glu Ile Ala His Glu Gln Asn Gln Pro Leu  
385 390 395 400

Ala Ala Ile His Ala Leu Thr Asp Asn Ala Arg Thr Met Leu Lys Lys  
405 410 415

Glu Met Tyr Pro Gln Val Glu Gln Asn Leu Lys His Ile Ile Ser Val  
420 425 430

Ile Glu Arg Met Thr Gln Leu Ile Ser Glu Leu Lys Ala Phe Ala Ser  
435 440 445

Arg His Arg Val Pro Lys Gly Ser Ala Asp Val Ile Lys Val Met Tyr  
450 455 460

Ser Ala Val Ala Leu Leu Asn His Ser Met Glu Lys Asn Asn Ile Glu  
465 470 475 480

Arg Arg Ile Lys Ala Pro Ser Met Pro Leu Phe Val Asn Cys Asp Glu  
485 490 495

Leu Gly Leu Glu Gln Ile Phe Ser Asn Leu Ile Ser Asn Ala Leu Asp  
500 505 510

Ser Met Glu Gly Ser Ser Tyr Lys Arg Leu Asp Ile Ala Ile Arg Gln  
515 520 525

Ala Asn Asn Lys Val Ile Ile Thr Ile Lys Asp Ser Gly Gly Gly Phe

530

535

540

Ala Pro Glu Val Val Asp Arg Ile Phe Glu Pro Phe Phe Thr Thr Lys  
 545 550 555 560

Arg Arg Gly Met Gly Leu Gly Leu Ala Ile Val Ser Glu Ile Val Arg  
 565 570 575

Asn Ser Asn Gly Ala Leu His Ala Ser Asn His Pro Glu Gly Gly Ala  
 580 585 590

Val Met Thr Leu Thr Trp Pro Glu Trp Gly Glu Glu His Glu  
 595 600 605

&lt;210&gt; 22

&lt;211&gt; 101

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 22

Val Leu Thr Pro Gln His Leu Arg Cys Val Leu Thr Cys Ser Asp Leu  
 1 5 10 15

Leu Thr Leu Leu Ser Gly Thr Val Met Ser Gln Met Pro Leu Tyr Phe  
 20 25 30

Leu Asn Thr Gln Lys Lys Leu Thr Ala His Tyr Glu Trp Leu Gln Ile  
 35 40 45

Asn Leu Thr Asp Thr Tyr Glu Leu Val Lys Arg Leu Met Pro Ile Pro  
 50 55 60

Ser Leu Asp Val Val Val Lys Val Gly Lys Leu Val Leu Pro Glu Lys  
 65 70 75 80

Gly His His Gly Phe Tyr Pro Glu Ala Gly Val Val Tyr Arg Thr Val  
 85 90 95

Ala Pro Glu Asn Pro  
 100

<210> 23  
<211> 263  
<212> PRT

<213> Escherichia coli

<400> 23

Met Met Lys Asn Thr Gly Tyr Ile Leu Ala Leu Cys Leu Thr Ala Ser  
1 5 10 15

Gly His Val Leu Ala His Asp Val Trp Ile Thr Gly Lys Gln Ala Glu  
20 25 30

Asn Asn Val Thr Ala Glu Ile Gly Tyr Gly His Asn Phe Pro Ser Lys  
35 40 45

Gly Thr Ile Pro Asp Arg Arg Asp Phe Phe Glu Asn Pro Arg Leu Tyr  
50 55 60

Asn Gly Lys Glu Thr Ile Thr Leu Lys Pro Ala Ser Thr Asp Tyr Val  
65 70 75 80

Tyr Lys Thr Glu Ser Ala Ser Lys Asp Asn Gly Tyr Val Leu Ser Thr  
85 90 95

Tyr Met Lys Pro Gly Tyr Trp Ser Arg Thr Ser Ser Gly Trp Lys Pro  
100 105 110

Val Ser Arg Glu Gly Arg Asn Asp Val Ala Tyr Cys Glu Phe Val Thr  
115 120 125

Lys Tyr Ala Lys Ser Phe Ile Pro Gly Glu Gln Gln Met Pro Ala Gln  
130 135 140

Leu Tyr Gln Ser Pro Thr Gly His Glu Leu Glu Ile Ile Pro Leu Ser  
145 150 155 160

Asp Ile Ser Arg Phe Ser Glu Asn Val Lys Leu Lys Val Leu Tyr Lys  
165 170 175

Thr Ser Pro Leu Ala Gly Ala Ile Met Glu Leu Asp Ser Val Ser Tyr  
180 185 190

Leu Thr Ser Ser Arg His Thr His Ala Val Glu His Lys His Pro Val  
195 200 205

His Lys Ala Glu Leu Thr Phe Val Thr Asn Glu Asp Gly Ile Val Thr  
210 215 220

Val Pro Ser Leu His Ile Gly Gln Trp Leu Ala Lys Val Gln Asn Lys  
225 230 235 240

Lys Ser Phe Gln Asp Lys Ser Leu Cys Asp Glu Thr Val Asp Val Ala  
245 250 255

Thr Leu Ser Phe Ser Arg Asn  
260

<210> 24  
<211> 378  
<212> PRT

<213> Escherichia coli

<400> 24

Met Gly Lys Ile Lys Tyr Trp Leu Ile Val Gly Phe Ile Ile Leu Phe  
1 5 10 15

Ala Ile Phe Tyr Ile Ala Ile Ser Asp Arg Asp Ser Thr Leu Ser Arg  
20 25 30

Leu Lys Ser Ala Gly Glu Asn Gly Asp Val Glu Ala Gln Tyr Ala Leu  
35 40 45

Gly Leu Met Tyr Leu Tyr Gly Glu Ile Leu Asp Val Asp Tyr Gln Gln  
50 55 60

Ala Lys Ile Trp Tyr Glu Lys Ala Ala Asp Gln Asn Asp Pro Arg Ala  
65 70 75 80

Gln Ala Lys Leu Gly Val Met Tyr Ala Asn Gly Leu Gly Val Asn Gln  
85 90 95

Asp Tyr Gln Gln Ser Lys Leu Trp Tyr Glu Lys Ala Ala Ala Gln Asn  
100 105 110

Asp Val Asp Ala Gln Phe Leu Leu Gly Glu Met Tyr Asp Asp Gly Leu  
115 120 125

Gly Val Ser Gln Asp Tyr Gln His Ala Lys Met Trp Tyr Glu Lys Ala  
130 135 140

Ala Ala Gln Asn Asp Glu Arg Ala Gln Val Asn Leu Ala Val Leu Tyr  
145 150 155 160

Ala Lys Gly Asn Gly Val Glu Gln Asp Tyr Arg Gln Ala Lys Ser Trp  
165 170 175

Tyr Glu Lys Ala Ala Ala Gln Asn Ser Pro Asp Ala Gln Phe Ala Leu  
180 185 190

Gly Ile Leu Tyr Ala Asn Ala Asn Gly Val Glu Gln Asp Tyr Gln Gln  
195 200 205

Ala Lys Asp Trp Tyr Glu Lys Ala Ala Glu Gln Asn Phe Ala Asn Ala  
210 215 220

Gln Phe Asn Leu Gly Met Leu Tyr Tyr Lys Gly Glu Gly Val Lys Gln  
225 230 235 240

Asn Phe Arg Gln Ala Arg Glu Trp Phe Glu Lys Ala Ala Ser Gln Asn  
245 250 255

Gln Pro Asn Ala Gln Tyr Asn Leu Gly Gln Ile Tyr Tyr Tyr Gly Gln  
260 265 270

Gly Val Thr Gln Ser Tyr Arg Gln Ala Lys Asp Trp Phe Glu Lys Ala  
275 280 285

Ala Glu Lys Gly His Val Asp Ala Gln Tyr Asn Leu Gly Val Ile Tyr  
290 295 300

Glu Asn Gly Glu Gly Val Ser Gln Asn Tyr Gln Gln Ala Lys Ala Trp  
305 310 315 320

Tyr Glu Lys Ala Ala Ser Gln Asn Asp Ala Gln Ala Gln Phe Glu Leu  
325 330 335

Gly Val Met Asn Glu Leu Gly Gln Gly Glu Ser Ile Asp Leu Lys Gln  
340 345 350

Ala Arg His Tyr Tyr Glu Arg Ser Cys Asn Asn Gly Leu Lys Lys Gly  
355 360 365

Cys Glu Arg Leu Lys Glu Leu Leu Tyr Lys  
370 375

<210> 25  
<211> 654  
<212> PRT

<213> Escherichia coli

<400> 25

Met Asn Val Ile Arg Thr Val Ile Cys Thr Leu Ile Ile Leu Pro Val  
1 5 10 15

Gly Leu Gln Ala Ala Thr Ser His Ser Ser Met Val Lys Asp Thr Ile  
20 25 30

Thr Ile Val Ala Thr Gly Asn Gln Asn Thr Val Phe Glu Thr Pro Ser  
35 40 45

Met Val Ser Val Val Thr Asn Asp Thr Pro Trp Ser Gln Asn Ala Val  
50 55 60

Thr Ser Ala Gly Met Leu Lys Gly Val Ala Gly Leu Ser Gln Thr Gly  
65 70 75 80

Ala Gly Arg Thr Asn Gly Gln Thr Phe Asn Leu Arg Gly Tyr Asp Lys  
85 90 95

Ser Gly Val Leu Val Leu Val Asp Gly Val Arg Gln Leu Ser Asp Met  
100 105 110

Ala Lys Ser Ser Gly Thr Tyr Leu Asp Pro Ala Leu Val Lys Arg Ile  
115 120 125

Glu Val Val Arg Gly Pro Asn Ser Ser Leu Tyr Gly Ser Gly Gly Leu  
130 135 140

Gly Gly Val Val Asp Phe Arg Thr Ala Asp Ala Ala Asp Phe Leu Pro  
145 150 155 160

Pro Gly Glu Thr Asn Gly Leu Ser Leu Trp Gly Asn Ile Ala Ser Gly  
165 170 175

Asp His Ser Thr Gly Ser Gly Leu Thr Trp Phe Gly Lys Thr Gly Lys  
180 185 190

Thr Asp Ala Leu Leu Ser Val Ile Met Arg Lys Arg Gly Asn Ile Tyr  
195 200 205

Gln Ser Asp Gly Glu His Ala Pro Asn Lys Glu Lys Pro Ala Ala Leu  
210 215 220

Phe Ala Lys Gly Ser Val Gly Ile Thr Asp Ser Asn Lys Ala Gly Ala  
225 230 235 240

Ser Leu Arg Leu Tyr Arg Asn Asn Thr Thr Glu Pro Gly Asn Ser Thr  
245 250 255

Gln Thr His Gly Asp Ser Gly Leu Arg Asp Arg Lys Thr Val Gln Asn  
260 265 270

Asp Val Gln Phe Trp Tyr Gln Tyr Ala Pro Val Asp Asn Ser Leu Ile  
275 280 285

Asn Val Lys Ser Thr Leu Tyr Leu Ser Asp Ile Thr Ile Lys Thr Asn  
290 295 300

Gly His Asn Lys Thr Ala Glu Trp Arg Asn Asn Arg Thr Ser Gly Val  
305 310 315 320

Asn Val Val Asn Arg Ser His Thr Leu Ile Phe Pro Gly Ala His Gln  
325 330 335

Leu Ser Tyr Gly Ala Glu Tyr Tyr Arg Gln Gln Gln Lys Pro Glu Gly  
340 345 350

Ser Ala Thr Leu Tyr Pro Glu Gly Asn Ile Asp Phe Thr Ser Leu Tyr



355

360

365

Phe Gln Asp Glu Met Thr Met Lys Ser Tyr Pro Val Asn Ile Ile Val  
370 375 380

Gly Ser Arg Tyr Asp Arg Tyr Lys Ser Phe Asn Pro Arg Ala Gly Glu  
385 390 395 400

Leu Lys Ala Glu Arg Leu Ser Pro Arg Ala Ala Ile Ser Val Ser Pro  
405 410 415

Thr Asp Trp Leu Met Met Tyr Gly Ser Ile Ser Ser Ala Phe Arg Ala  
420 425 430

Pro Thr Met Ala Glu Met Tyr Arg Asp Asp Val His Phe Tyr Arg Lys  
435 440 445

Gly Lys Pro Asn Tyr Trp Val Pro Asn Leu Asn Leu Lys Pro Glu Asn  
450 455 460

Asn Ile Thr Arg Glu Ile Gly Ala Gly Ile Gln Leu Asp Gly Leu Leu  
465 470 475 480

Thr Asp Asn Asp Arg Leu Gln Leu Lys Gly Gly Tyr Phe Gly Thr Asp  
485 490 495

Ala Arg Asn Tyr Ile Ala Thr Arg Val Asp Met Lys Arg Met Arg Ser  
500 505 510

Tyr Ser Tyr Asn Val Ser Arg Ala Arg Ile Trp Gly Trp Asp Met Gln  
515 520 525

Gly Asn Tyr Gln Ser Asp Tyr Val Asp Trp Met Leu Ser Tyr Asn Arg  
530 535 540

Thr Glu Ser Met Asp Ala Ser Ser Arg Glu Trp Leu Gly Ser Gly Asn  
545 550 555 560

Pro Asp Thr Leu Ile Ser Asp Ile Ser Ile Pro Val Gly His Arg Gly  
565 570 575

Val Tyr Ala Gly Trp Arg Ala Glu Leu Ser Ala Ser Ala Thr His Val  
580 585 590

Lys Lys Gly Asp Pro His Gln Ala Gly Tyr Thr Ile His Ser Phe Ser  
595 600 605

Leu Ser Tyr Lys Pro Val Ser Val Lys Gly Phe Glu Ala Ser Val Thr  
610 615 620

Leu Asp Asn Ala Phe Asn Lys Leu Ala Met Asn Gly Lys Gly Val Pro  
625 630 635 640

Leu Ser Gly Arg Thr Val Ser Leu Tyr Thr Arg Tyr Gln Trp  
645 650

<210> 26

<211> 1376

<212> PRT

<213> Escherichia coli

<400> 26

Met Asn Lys Ile Tyr Ala Leu Lys Tyr Cys Tyr Ile Thr Asn Thr Val  
1 5 10 15

Lys Val Val Ser Glu Leu Ala Arg Arg Val Cys Lys Gly Ser Thr Arg  
20 25 30

Arg Gly Lys Arg Leu Ser Val Leu Thr Ser Leu Ala Leu Ser Ala Leu  
35 40 45

Leu Pro Thr Val Ala Gly Ala Ser Thr Val Gly Gly Asn Asn Pro Tyr  
50 55 60

Gln Thr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Gln Phe Gln Ala Gly  
65 70 75 80

Ala Thr Asn Ile Pro Ile Phe Asn Asn Lys Gly Glu Leu Val Gly His  
85 90 95

Leu Asp Lys Ala Pro Met Val Asp Phe Ser Ser Val Asn Val Ser Ser  
100 105 110

Asn Pro Gly Val Ala Thr Leu Ile Asn Pro Gln Tyr Ile Ala Ser Val  
115 120 125

Lys His Asn Lys Gly Tyr Gln Ser Val Ser Phe Gly Asp Gly Gln Asn  
130 135 140

Ser Tyr His Ile Val Asp Arg Asn Glu His Ser Ser Ser Asp Leu His  
145 150 155 160

Thr Pro Arg Leu Asp Lys Leu Val Thr Glu Val Ala Pro Ala Thr Val  
165 170 175

Thr Ser Ser Ser Thr Ala Asp Ile Leu Asn Pro Ser Lys Tyr Ser Ala  
180 185 190

Phe Tyr Arg Ala Gly Ser Gly Ser Gln Tyr Ile Gln Asp Ser Gln Gly  
195 200 205

Lys Arg His Trp Val Thr Gly Gly Tyr Gly Tyr Leu Thr Gly Gly Ile  
210 215 220

Leu Pro Thr Ser Phe Phe Tyr His Gly Ser Asp Gly Ile Gln Leu Tyr  
225 230 235 240

Met Gly Gly Asn Ile His Asp His Ser Ile Leu Pro Ser Phe Gly Glu  
245 250 255

Ala Gly Asp Ser Gly Ser Pro Leu Phe Gly Trp Asn Thr Ala Lys Gly  
260 265 270

Gln Trp Glu Leu Val Gly Val Tyr Ser Gly Val Gly Gly Gly Thr Asn  
275 280 285

Leu Ile Tyr Ser Leu Ile Pro Gln Ser Phe Leu Ser Gln Ile Tyr Ser  
290 295 300

Glu Asp Asn Asp Ala Pro Val Phe Phe Asn Ala Ser Ser Gly Ala Pro  
305 310 315 320

Leu Gln Trp Lys Phe Asp Ser Ser Thr Gly Thr Gly Ser Leu Lys Gln  
325 330 335

Gly Ser Asp Glu Tyr Ala Met His Gly Gln Lys Gly Ser Asp Leu Asn  
340 345 350

Ala Gly Lys Asn Leu Thr Phe Leu Gly His Asn Gly Gln Ile Asp Leu  
355 360 365

Glu Asn Ser Val Thr Gln Gly Ala Gly Ser Leu Thr Phe Thr Asp Asp  
370 375 380

Tyr Thr Val Thr Thr Ser Asn Gly Ser Thr Trp Thr Gly Ala Gly Ile  
385 390 395 400

Ile Val Asp Lys Asp Ala Ser Val Asn Trp Gln Val Asn Gly Val Lys  
405 410 415

Gly Asp Asn Leu His Lys Ile Gly Glu Gly Thr Leu Val Val Gln Gly  
420 425 430

Thr Gly Val Asn Glu Gly Gly Leu Lys Val Gly Asp Gly Thr Val Val  
435 440 445

Leu Asn Gln Gln Ala Asp Ser Ser Gly His Val Gln Ala Phe Ser Ser  
450 455 460

Val Asn Ile Ala Ser Gly Arg Pro Thr Val Val Leu Ala Asp Asn Gln  
465 470 475 480

Gln Val Asn Pro Asp Asn Ile Ser Trp Gly Tyr Arg Gly Gly Val Leu  
485 490 495

Asp Val Asn Gly Asn Asp Leu Thr Phe His Lys Leu Asn Ala Ala Asp  
500 505 510

Tyr Gly Ala Thr Leu Gly Asn Ser Ser Asp Lys Thr Ala Asn Ile Thr  
515 520 525

Leu Asp Tyr Gln Thr Arg Pro Ala Asp Val Lys Val Asn Glu Trp Ser  
530 535 540

Ser Ser Asn Arg Gly Thr Val Gly Ser Leu Tyr Ile Tyr Asn Asn Pro  
545 550 555 560

Tyr Thr His Thr Val Asp Tyr Phe Ile Leu Lys Thr Ser Ser Tyr Gly  
565 570 575

Trp Phe Pro Thr Gly Gln Val Ser Asn Glu His Trp Glu Tyr Val Gly

580

585

590

His Asp Gln Asn Ser Ala Gln Ala Leu Leu Ala Asn Arg Ile Asn Asn  
595 600 605

Lys Gly Tyr Leu Tyr His Gly Lys Leu Leu Gly Asn Ile Asn Phe Ser  
610 615 620

Asn Lys Ala Thr Pro Gly Thr Thr Gly Ala Leu Val Met Asp Gly Ser  
625 630 635 640

Ala Asn Met Ser Gly Thr Phe Thr Gln Glu Asn Gly Arg Leu Thr Ile  
645 650 655

Gln Gly His Pro Val Ile His Ala Ser Thr Ser Gln Ser Ile Ala Asn  
660 665 670

Thr Val Ser Ser Leu Gly Asp Asn Ser Val Leu Thr Gln Pro Thr Ser  
675 680 685

Phe Thr Gln Asp Asp Trp Glu Asn Arg Thr Phe Ser Phe Gly Ser Leu  
690 695 700

Val Leu Lys Asp Thr Asp Phe Gly Leu Gly Arg Asn Ala Thr Leu Asn  
705 710 715 720

Thr Thr Ile Gln Ala Asp Asn Ser Ser Val Thr Leu Gly Asp Ser Arg  
725 730 735

Val Phe Ile Asp Lys Lys Asp Gly Gln Gly Thr Ala Phe Thr Leu Glu  
740 745 750

Glu Gly Thr Ser Val Ala Thr Lys Asp Ala Asp Lys Ser Val Phe Asn  
755 760 765

Gly Thr Val Asn Leu Asp Asn Gln Ser Val Leu Asn Ile Asn Glu Ile  
770 775 780

Phe Asn Gly Gly Ile Gln Ala Asn Asn Ser Thr Val Asn Ile Ser Ser  
785 790 795 800

Asp Ser Ala Val Leu Glu Asn Ser Thr Leu Thr Ser Thr Ala Leu Asn  
805 810 815

Leu Asn Lys Gly Ala Asn Val Leu Ala Ser Gln Ser Phe Val Ser Asp  
820 825 830

Gly Pro Val Asn Ile Ser Asp Ala Thr Leu Ser Leu Asn Ser Arg Pro  
835 840 845

Asp Glu Val Ser His Thr Leu Leu Pro Val Tyr Asp Tyr Ala Gly Ser  
850 855 860

Trp Asn Leu Lys Gly Asp Asp Ala Arg Leu Asn Val Gly Pro Tyr Ser  
865 870 875 880

Met Leu Ser Gly Asn Ile Asn Val Gln Asp Lys Gly Thr Val Thr Leu  
885 890 895

Gly Gly Glu Gly Glu Leu Ser Pro Asp Leu Thr Leu Gln Asn Gln Met  
900 905 910

Leu Tyr Ser Leu Phe Asn Gly Tyr Arg Asn Thr Trp Ser Gly Ser Leu  
915 920 925

Asn Ala Pro Asp Ala Thr Val Ser Met Thr Asp Thr Gln Trp Ser Met  
930 935 940

Asn Gly Asn Ser Thr Ala Gly Asn Met Lys Leu Asn Arg Thr Ile Val  
945 950 955 960

Gly Phe Asn Gly Gly Thr Ser Ser Phe Thr Thr Leu Thr Thr Asp Asn  
965 970 975

Leu Asp Ala Val Gln Ser Ala Phe Val Met Arg Thr Asp Leu Asn Lys  
980 985 990

Ala Asp Lys Leu Val Ile Asn Lys Ser Ala Thr Gly His Asp Asn Ser  
995 1000 1005

Ile Trp Val Asn Phe Leu Lys Lys Pro Ser Asp Lys Asp Thr Leu  
1010 1015 1020

Asp Ile Pro Leu Val Ser Ala Pro Glu Ala Thr Ala Asp Asn Leu  
1025 1030 1035

Phe Arg Ala Ser Thr Arg Val Val Gly Phe Ser Asp Val Thr Pro  
1040 1045 1050

Thr Leu Ser Val Arg Lys Glu Asp Gly Lys Lys Glu Trp Val Leu  
1055 1060 1065

Asp Gly Tyr Gln Val Ala Arg Asn Asp Gly Gln Gly Lys Ala Ala  
1070 1075 1080

Ala Thr Phe Met His Ile Ser Tyr Asn Asn Phe Ile Thr Glu Val  
1085 1090 1095

Asn Asn Leu Asn Lys Arg Met Gly Asp Leu Arg Asp Ile Asn Gly  
1100 1105 1110

Glu Ala Gly Thr Trp Val Arg Leu Leu Asn Gly Ser Gly Ser Ala  
1115 1120 1125

Asp Gly Gly Phe Thr Asp His Tyr Thr Leu Leu Gln Met Gly Ala  
1130 1135 1140

Asp Arg Lys His Glu Leu Gly Ser Met Asp Leu Phe Thr Gly Val  
1145 1150 1155

Met Ala Thr Tyr Thr Asp Thr Asp Ala Ser Ala Gly Leu Tyr Ser  
1160 1165 1170

Gly Lys Thr Lys Ser Trp Gly Gly Gly Phe Tyr Ala Ser Gly Leu  
1175 1180 1185

Phe Arg Ser Gly Ala Tyr Phe Asp Leu Ile Ala Lys Tyr Ile His  
1190 1195 1200

Asn Glu Asn Lys Tyr Asp Leu Asn Phe Ala Gly Ala Gly Lys Gln  
1205 1210 1215

Asn Phe Arg Ser His Ser Leu Tyr Ala Gly Ala Glu Val Gly Tyr  
1220 1225 1230

Arg Tyr His Leu Thr Asp Thr Thr Phe Val Glu Pro Gln Ala Glu  
1235 1240 1245

Leu Val Trp Gly Arg Leu Gln Gly Gln Thr Phe Asn Trp Asn Asp  
1250 1255 1260

Ser Gly Met Asp Val Ser Met Arg Arg Asn Ser Val Asn Pro Leu  
1265 1270 1275

Val Gly Arg Thr Gly Val Val Ser Gly Lys Thr Phe Ser Gly Lys  
1280 1285 1290

Asp Trp Ser Leu Thr Ala Arg Ala Gly Leu His Tyr Glu Phe Asp  
1295 1300 1305

Leu Thr Asp Ser Ala Asp Val His Leu Lys Asp Ala Ala Gly Glu  
1310 1315 1320

His Gln Ile Asn Gly Arg Lys Asp Gly Arg Met Leu Tyr Gly Val  
1325 1330 1335

Gly Leu Asn Ala Arg Phe Gly Asp Asn Thr Arg Leu Gly Leu Glu  
1340 1345 1350

Val Glu Arg Ser Ala Phe Gly Lys Tyr Asn Thr Asp Asp Ala Ile  
1355 1360 1365

Asn Ala Asn Ile Arg Tyr Ser Phe  
1370 1375

<210> 27

<211> 349

<212> PRT

<213> Escherichia coli

<400> 27

Met Ile Thr Leu Phe Arg Leu Leu Ala Ile Leu Cys Leu Phe Phe Asn  
1 5 10 15

Val Ser Ala Phe Ala Val Asp Cys Tyr Gln Asp Gly Tyr Arg Gly Thr  
20 25 30

Thr Leu Ile Asn Gly Asp Leu Pro Thr Phe Lys Ile Pro Glu Asn Ala  
35 40 45

Gln Pro Gly Gln Lys Ile Trp Glu Ser Gly Asp Ile Asn Ile Thr Val



50

55

60

Tyr Cys Asp Asn Ala Pro Gly Trp Ser Ser Asn Asn Pro Ser Glu Asn  
65 70 75 80

Val Tyr Ala Trp Ile Lys Leu Pro Gln Ile Asn Ser Ala Asp Met Leu  
85 90 95

Asn Asn Pro Tyr Leu Thr Phe Gly Val Thr Tyr Asn Gly Val Asp Tyr  
100 105 110

Glu Gly Thr Asn Glu Lys Ile Asp Thr His Ala Cys Leu Asp Lys Tyr  
115 120 125

Glu Gln Tyr Tyr Asn Gly Tyr Tyr His Asp Pro Val Cys Asn Gly Ser  
130 135 140

Thr Leu Gln Lys Asn Val Thr Phe Asn Ala His Phe Arg Val Tyr Val  
145 150 155 160

Lys Phe Lys Ser Arg Pro Ala Gly Asp Gln Thr Val Asn Phe Gly Thr  
165 170 175

Val Asn Val Leu Gln Phe Asp Gly Glu Gly Gly Ala Asn Met Ala Pro  
180 185 190

Asn Ala Lys Asn Leu Arg Tyr Ala Ile Thr Gly Leu Asp Asn Ile Ser  
195 200 205

Phe Leu Asp Cys Ser Val Asp Val Arg Ile Ser Pro Glu Ser Gln Ile  
210 215 220

Val Asn Phe Gly Gln Ile Ala Ala Asn Ser Ile Ala Thr Phe Pro Pro  
225 230 235 240

Lys Ala Ala Phe Ser Val Ser Thr Ile Lys Asp Ile Ala Ser Asp Cys  
245 250 255

Thr Glu Gln Phe Asp Val Ala Thr Ser Phe Phe Thr Ser Asp Thr Leu  
260 265 270

Tyr Asp Asn Thr His Leu Glu Ile Gly Asn Gly Leu Leu Met Arg Ile  
275 280 285

Thr Asp Gln Lys Thr Gln Glu Asp Ile Lys Phe Asn Gln Phe Lys Leu  
290 295 300

Phe Ser Thr Tyr Ile Pro Gly Gln Ser Ala Ala Met Ala Thr Arg Asp  
305 310 315 320

Tyr Gln Ala Glu Leu Thr Gln Lys Pro Gly Glu Pro Leu Val Tyr Gly  
325 330 335

Pro Phe Gln Lys Asp Leu Ile Val Lys Ile Asn Tyr His  
340 345

<210> 28

<211> 840

<212> PRT

<213> Escherichia coli

<400> 28

Met Asn Asn Lys Asn Thr Phe Ser Arg Asp Lys Leu Ser His Ala Ile  
1 5 10 15

Lys Asn Ala Leu Ser Gly Val Val Cys Ser Leu Leu Phe Val Leu Pro  
20 25 30

Val His Ala Val Glu Phe Asn Val Asp Met Ile Asp Ala Glu Asp Arg  
35 40 45

Glu Asn Ile Asp Ile Ser Arg Phe Glu Lys Lys Gly Tyr Ile Pro Pro  
50 55 60

Gly Arg Tyr Leu Val Arg Val Gln Ile Asn Lys Asn Met Leu Pro Gln  
65 70 75 80

Thr Leu Ile Leu Glu Trp Val Lys Ala Asp Asn Glu Ser Gly Ser Leu  
85 90 95

Leu Cys Leu Thr Lys Glu Asn Leu Thr Asn Phe Gly Leu Asn Thr Glu  
100 105 110

Phe Ile Glu Ser Leu Gln Asn Ile Ala Gly Ser Glu Cys Leu Asp Leu  
115 120 125

Ser Gln Arg Gln Glu Leu Thr Thr Arg Leu Asp Lys Ala Thr Met Ile  
130 135 140

Leu Ser Leu Ser Val Pro Gln Ala Trp Leu Lys Tyr Gln Ala Thr Asn  
145 150 155 160

Trp Thr Pro Pro Glu Phe Trp Asp Thr Gly Ile Thr Gly Phe Ile Leu  
165 170 175

Asp Tyr Asn Val Tyr Ala Ser Gln Tyr Ala Pro His His Gly Asp Ser  
180 185 190

Thr Gln Asn Val Ser Ser Tyr Gly Thr Leu Gly Phe Asn Leu Gly Ala  
195 200 205

Trp Arg Leu Arg Ser Asp Tyr Gln Tyr Asn Gln Asn Phe Ala Asp Gly  
210 215 220

Arg Ser Val Asn Arg Asp Ser Glu Phe Ala Arg Thr Tyr Leu Phe Arg  
225 230 235 240

Pro Ile Pro Ser Trp Ser Ser Lys Phe Thr Met Gly Gln Tyr Asp Leu  
245 250 255

Ser Ser Asn Leu Tyr Asp Thr Phe His Phe Thr Gly Ala Ser Leu Glu  
260 265 270

Ser Asp Glu Ser Met Leu Pro Pro Asp Leu Gln Gly Tyr Ala Pro Gln  
275 280 285

Ile Thr Gly Ile Ala Gln Thr Asn Ala Lys Val Thr Val Ala Gln Asn  
290 295 300

Gly Arg Val Leu Tyr Gln Thr Thr Val Ala Pro Gly Pro Phe Thr Ile  
305 310 315 320

Ser Asp Leu Gly Gln Ser Phe Gln Gly Gln Leu Asp Val Thr Val Glu  
325 330 335

Glu Glu Asp Gly Arg Thr Ser Thr Phe Gln Val Gly Ser Ala Ser Ile  
340 345 350

Pro Tyr Leu Thr Arg Lys Gly Gln Val Arg Tyr Lys Thr Ser Leu Gly  
355 360 365

Lys Pro Thr Ser Val Gly His Asn Asp Ile Asn Asn Pro Phe Phe Trp  
370 375 380

Thr Ala Glu Ala Ser Trp Gly Trp Leu Asn Asn Val Ser Leu Tyr Gly  
385 390 395 400

Gly Gly Met Phe Thr Ala Asp Asp Tyr Gln Ala Ile Thr Thr Gly Ile  
405 410 415

Gly Phe Asn Leu Asn Gln Phe Gly Ser Leu Ser Phe Asp Val Thr Gly  
420 425 430

Ala Asp Ala Ser Leu Gln Gln Gln Asn Ser Gly Asn Leu Arg Gly Tyr  
435 440 445

Ser Tyr Arg Phe Asn Tyr Ala Lys His Phe Glu Ser Thr Gly Ser Gln  
450 455 460

Ile Thr Phe Ala Gly Tyr Arg Phe Ser Asp Lys Asp Tyr Val Ser Met  
465 470 475 480

Ser Glu Tyr Leu Ser Ser Arg Asn Gly Asp Glu Ser Ile Asp Asn Glu  
485 490 495

Lys Glu Ser Tyr Val Ile Ser Leu Asn Gln Tyr Phe Glu Thr Leu Glu  
500 505 510

Leu Asn Ser Tyr Leu Asn Val Thr Arg Asn Thr Tyr Trp Asp Ser Ala  
515 520 525

Ser Asn Thr Asn Tyr Ser Val Ser Val Ser Lys Asn Phe Asp Ile Gly  
530 535 540

Asp Phe Lys Gly Ile Ser Ala Ser Leu Ala Val Ser Arg Ile Arg Trp  
545 550 555 560

Asp Asp Asp Glu Glu Asn Gln Tyr Tyr Phe Ser Phe Ser Leu Pro Leu  
565 570 575

Gln Gln Asn Arg Asn Ile Ser Tyr Ser Met Gln Arg Thr Gly Ser Ser

580

585

590

Asn Thr Ser Gln Met Ile Ser Trp Tyr Asp Ser Ser Asp Arg Asn Asn  
 595 600 605

Ile Trp Asn Ile Ser Ala Ser Ala Thr Asp Asp Asn Ile Arg Asp Gly  
 610 615 620

Glu Pro Thr Leu Arg Gly Ser Tyr Gln His Tyr Ser Pro Trp Gly Arg  
 625 630 635 640

Leu Asn Ile Asn Gly Ser Val Gln Pro Asn Gln Tyr Asn Ser Val Thr  
 645 650 655

Ala Gly Trp Tyr Gly Ser Leu Thr Ala Thr Arg His Gly Val Ala Leu  
 660 665 670

His Asp Tyr Ser Tyr Gly Asp Asn Ala Arg Met Met Val Asp Thr Asp  
 675 680 685

Gly Ile Ser Gly Ile Glu Ile Asn Ser Asn Arg Thr Val Thr Asn Gly  
 690 695 700

Leu Gly Ile Ala Val Ile Pro Ser Leu Ser Asn Tyr Thr Thr Ser Met  
 705 710 715 720

Leu Arg Val Asn Asn Asn Asp Leu Pro Glu Gly Val Asp Val Glu Asn  
 725 730 735

Ser Val Ile Arg Thr Thr Leu Thr Gln Gly Ala Ile Gly Tyr Ala Lys  
 740 745 750

Leu Asn Ala Thr Thr Gly Tyr Gln Ile Val Gly Val Ile Arg Gln Glu  
 755 760 765

Asn Gly Arg Phe Pro Pro Leu Gly Val Asn Val Thr Asp Lys Ala Thr  
 770 775 780

Gly Lys Asp Val Gly Leu Val Ala Glu Asp Gly Phe Val Tyr Leu Ser  
 785 790 795 800

Gly Ile Gln Glu Asn Ser Ile Leu His Leu Thr Trp Gly Asp Asn Thr  
 805 810 815

Cys Glu Val Thr Pro Pro Asn Gln Ser Asn Ile Ser Glu Ser Ala Ile  
820 825 830

Ile Leu Pro Cys Lys Thr Val Lys  
835 840

<210> 29  
<211> 169  
<212> PRT

<213> Escherichia coli

<400> 29

Leu Met Asn Thr Lys Gln Ser Val Ala Gln Leu Ala Val Pro His Arg  
1 5 10 15

Lys Arg Leu Ser Ser Thr Met Val Val Ala Leu Leu Leu Cys Val Val  
20 25 30

Ala Gly Ala Val Met Ile Asn Ala Ala Asp Phe Pro Ala Thr Ala Ile  
35 40 45

Glu Thr Asp Pro Gly Ala Ser Ala Phe Pro Thr Phe Tyr Ala Cys Ala  
50 55 60

Leu Ile Val Leu Ala Val Leu Leu Val Ile Arg Asp Leu Leu Gln Ala  
65 70 75 80

Lys Pro Ala Ser Cys Ala Asn Ala Gln Glu Lys Pro Ala Phe Arg Lys  
85 90 95

Thr Ala Thr Gly Ile Ala Ala Thr Ala Phe Tyr Ile Val Ala Met Ser  
100 105 110

Tyr Cys Gly Tyr Leu Ile Thr Thr Pro Val Phe Leu Ile Val Ile Met  
115 120 125

Thr Leu Met Gly Tyr Arg Arg Trp Val Leu Thr Pro Gly Ile Ala Leu  
130 135 140

Leu Leu Thr Ala Ile Leu Trp Leu Leu Phe Val Glu Ala Leu Gln Val  
145 150 155 160

Pro Leu Pro Val Gly Thr Phe Phe Glu  
165

<210> 30  
<211> 311  
<212> PRT

<213> Escherichia coli

<400> 30

Met Val Leu Leu Ala Gly Ala Ala Leu Ser Ile Ala Pro Val Gln Ala  
1 5 10 15

Ala Ser Tyr Pro Thr Lys Gln Ile Glu Leu Val Val Pro Tyr Ala Ala  
20 25 30

Gly Gly Gly Thr Asp Leu Val Ala Arg Ala Phe Ala Asp Ala Ala Lys  
35 40 45

Asn His Leu Pro Val Ser Ile Gly Val Ile Asn Lys Pro Gly Gly Gly  
50 55 60

Gly Ala Ile Gly Leu Ser Glu Ile Ala Ala Ala Arg Pro Asn Gly Tyr  
65 70 75 80

Lys Ile Gly Leu Gly Thr Val Glu Leu Thr Thr Leu Pro Ser Leu Gly  
85 90 95

Met Val Arg Phe Lys Thr Ser Asp Phe Lys Pro Ile Ala Arg Leu Asn  
100 105 110

Ala Asp Pro Ala Ala Ile Thr Val Arg Ala Asp Ala Pro Trp Asn Ser  
115 120 125

Tyr Glu Glu Phe Met Ala Tyr Ser Lys Ala Asn Pro Gly Lys Val Arg  
130 135 140

Ile Gly Asn Ser Gly Thr Gly Ala Ile Trp His Leu Ala Ala Ala Ala  
145 150 155 160

Leu Glu Asp Lys Thr Gly Thr Lys Phe Ser His Val Pro Tyr Asp Gly  
165 170 175

Ala Ala Pro Ala Ile Thr Gly Leu Leu Gly Gly His Ile Glu Ala Val  
180 185 190

Ser Val Ser Pro Gly Glu Val Ile Asn His Val Asn Gly Gly Lys Leu  
195 200 205

Lys Thr Leu Val Val Met Ala Asp Glu Arg Met Lys Thr Met Pro Asp  
210 215 220

Val Pro Thr Leu Lys Glu Lys Gly Val Asp Leu Ser Ile Gly Thr Trp  
225 230 235 240

Arg Gly Leu Ile Val Ser Gln Lys Thr Pro Gln Asp Val Val Asp Val  
245 250 255

Leu Ala Lys Ala Ala Lys Glu Thr Ala Glu Glu Pro Ala Phe Gln Asp  
260 265 270

Ala Leu Gln Lys Leu Asn Leu Asn Tyr Ala Trp Leu Asp Ala Ala Ser  
275 280 285

Phe Gln Thr Gln Ile Ser Glu Gln Glu Lys Tyr Phe Asp Glu Leu Leu  
290 295 300

Thr Arg Leu Gly Leu Lys Lys  
305 310

<210> 31  
<211> 722  
<212> PRT

<213> Escherichia coli

<400> 31

Met Leu Arg Trp Lys Arg Cys Ile Ile Leu Thr Phe Ile Ser Gly Ala  
1 5 10 15

Ala Phe Ala Ala Pro Glu Ile Asn Val Lys Gln Asn Glu Ser Leu Pro  
20 25 30

Asp Leu Gly Ser Gln Ala Ala Gln Gln Asp Glu Gln Thr Asn Lys Gly  
35 40 45

Lys Ser Leu Lys Glu Arg Gly Ala Asp Tyr Val Ile Asn Ser Ala Thr



50

55

60

Gln Gly Phe Glu Asn Leu Thr Pro Glu Ala Leu Glu Ser Gln Ala Arg  
65 70 75 80

Ser Tyr Leu Gln Ser Gln Ile Thr Ser Thr Ala Gln Ser Tyr Ile Glu  
85 90 95

Asp Thr Leu Ser Pro Tyr Gly Lys Val Arg Leu Asn Leu Ser Ile Gly  
100 105 110

Gln Gly Gly Asp Leu Asp Gly Ser Ser Ile Asp Tyr Phe Val Pro Trp  
115 120 125

Tyr Asp Asn Gln Thr Thr Val Tyr Phe Ser Gln Phe Ser Ala Gln Arg  
130 135 140

Lys Glu Asp Arg Thr Ile Gly Asn Ile Gly Leu Gly Val Arg Tyr Asn  
145 150 155 160

Phe Asp Lys Tyr Leu Leu Gly Gly Asn Ile Phe Tyr Asp Tyr Asp Phe  
165 170 175

Thr Arg Gly His Arg Arg Leu Gly Leu Gly Ala Glu Ala Trp Thr Asp  
180 185 190

Tyr Leu Lys Phe Ser Gly Asn Tyr Tyr His Pro Leu Ser Asp Trp Lys  
195 200 205

Asp Ser Glu Asp Phe Asp Phe Tyr Glu Glu Arg Pro Ala Arg Gly Trp  
210 215 220

Asp Ile Arg Ala Glu Val Trp Leu Pro Ser Tyr Pro Gln Leu Gly Gly  
225 230 235 240

Lys Ile Val Phe Glu Gln Tyr Tyr Gly Asp Glu Val Ala Leu Phe Gly  
245 250 255

Thr Asp Asn Leu Glu Lys Asp Pro Tyr Ala Val Thr Leu Gly Leu Asn  
260 265 270

Tyr Gln Pro Val Pro Leu Leu Thr Val Gly Thr Asp Tyr Lys Ala Gly  
275 280 285

Thr Gly Asp Asn Ser Asp Val Ser Ile Asn Ala Thr Leu Asn Tyr Gln  
290 295 300

Phe Gly Val Pro Leu Lys Asp Gln Leu Asp Ser Asp Lys Val Lys Ala  
305 310 315 320

Ala His Ser Leu Met Gly Ser Arg Leu Asp Phe Val Glu Arg Asn Asn  
325 330 335

Phe Ile Val Leu Glu Tyr Lys Glu Lys Asp Pro Leu Asp Val Thr Leu  
340 345 350

Trp Leu Lys Ala Asp Ala Thr Asn Glu His Pro Glu Cys Val Ile Lys  
355 360 365

Asp Thr Pro Glu Ala Ala Val Gly Leu Glu Lys Cys Lys Trp Thr Ile  
370 375 380

Asn Ala Leu Ile Asn His His Tyr Lys Ile Val Ala Ala Ser Trp Gln  
385 390 395 400

Ala Lys Asn Asn Ala Ala Arg Thr Leu Val Met Pro Val Ile Lys Glu  
405 410 415

Asn Thr Leu Thr Glu Gly Asn Asn Asn His Trp Asn Leu Val Leu Pro  
420 425 430

Ala Trp Gln Tyr Ser Ser Asp Gln Ala Glu Gln Glu Lys Leu Asn Thr  
435 440 445

Trp Arg Val Arg Leu Ala Leu Glu Asp Glu Lys Gly Asn Arg Gln Asn  
450 455 460

Ser Gly Val Val Glu Ile Thr Val Gln Gln Asp Arg Lys Ile Glu Leu  
465 470 475 480

Ile Val Asn Asn Ile Ala Asn Pro Glu Glu Asn Asn His Ser His Glu  
485 490 495

Ala Ser Ala Gln Ala Asp Gly Val Asp Gly Val Val Met Asp Leu Asp  
500 505 510

Val Thr Asp Ser Phe Gly Asp Asn Thr Asp Arg Asn Gly Asp Ala Leu  
515 520 525

Pro Glu Asp Asn Leu Thr Pro Gln Leu Tyr Asp Ala Gln Asp Lys Arg  
530 535 540

Val Thr Leu Thr Asn Lys Pro Cys Ser Thr Asp Asn Pro Cys Val Phe  
545 550 555 560

Ile Ala Lys Gln Asp Lys Glu Lys Gly Thr Val Thr Leu Ser Ser Thr  
565 570 575

Leu Pro Gly Thr Tyr Arg Trp Lys Ala Lys Ala Ala Pro Tyr Asp Asp  
580 585 590

Ser Asn Tyr Val Asp Val Thr Phe Leu Gly Ala Glu Ile Gly Gly Leu  
595 600 605

Asn Ala Phe Ile Tyr Arg Val Gly Ala Ala Lys Pro Ser Asn Leu Ile  
610 615 620

Gly Lys Asp Lys Glu Pro Leu Pro Ser Thr Thr Phe Ile Asp Leu Phe  
625 630 635 640

Tyr Gly Ala Thr Thr Ile Lys Thr Val Ser Ser Ser Arg Ser Lys Asn  
645 650 655

Leu Thr Lys Arg Trp Cys Ser Thr Thr Thr Ser Gly Asn Leu Pro Ala  
660 665 670

Arg Ala Ser Met Val Ser Gly Cys Thr Gly Glu His Ser Asn Glu Asp  
675 680 685

Ile Val Ile Pro Ala Thr Asn Arg Glu Ala Ala Gln Thr Tyr Gly Ala  
690 695 700

Gln Ala Gly Asp Gly Leu Gln Gly Tyr Gly Leu Arg Val Leu Tyr Thr  
705 710 715 720

Lys Lys

<210> 32  
<211> 319  
<212> PRT  
213> Escherichia coli

<400> 32

Met Lys Gln Asp Lys Arg Arg Gly Leu Thr Arg Ile Ala Leu Ala Leu  
1 5 10 15

Ala Leu Ala Gly Tyr Cys Val Ala Pro Val Ala Leu Ala Glu Asp Ser  
20 25 30

Ala Trp Val Asp Ser Gly Glu Thr Asn Ile Phe Gln Gly Thr Ile Pro  
35 40 45

Trp Leu Tyr Ser Glu Gly Gly Ser Ala Thr Thr Asp Ala Asp Arg Val  
50 55 60

Thr Leu Thr Ser Asp Leu Lys Gly Ala Arg Pro Gln Gly Met Lys Arg  
65 70 75 80

Thr Ser Val Phe Thr Arg Val Ile Asn Ile Gly Asp Thr Glu Gly Asp  
85 90 95

Val Asp Leu Gly Gly Leu Gly Asp Asn Ala Lys Thr Ile Asp Thr Ile  
100 105 110

Arg Trp Met Ser Tyr Lys Asp Ala Gln Gly Gly Asp Pro Lys Glu Leu  
115 120 125

Ala Thr Lys Val Thr Ser Tyr Thr Leu Thr Asp Ala Asp Arg Gly Arg  
130 135 140

Tyr Ile Gly Ile Glu Ile Thr Pro Thr Thr Gln Thr Gly Thr Pro Asn  
145 150 155 160

Val Gly Thr Ala Leu His Leu Tyr Asp Val Ser Thr Ala Ser Gly Gly  
165 170 175

Gly Ser Asp Ser Asp Asn Val Ala Pro Gly Pro Val Val Asn Gln Asn  
180 185 190

Leu Lys Val Ala Ile Phe Val Asp Gly Thr Ser Ile Asn Leu Ile Asn  
195 200 205

Gly Ser Thr Pro Ile Glu Leu Gly Lys Thr Tyr Val Ala Lys Leu Tyr  
210 215 220

Ser Asp Glu Asn Lys Asn Gly Lys Phe Asp Ala Gly Thr Asp Ala Asp  
225 230 235 240

Val Thr Ala Asn Tyr Asp Phe Arg Trp Val Leu Ser Gly Ser Ser Gln  
245 250 255

Gln Leu Gly Thr Ser Gly Gly Ile Val Asn Ser Ser Phe Asp Asn Asn  
260 265 270

Asn Leu Val Ile Pro Ala Thr Asn Asp Glu Ala Arg Thr Asn Leu Asn  
275 280 285

Gly Pro Ala Arg Asp Gly Lys Glu Ala Leu Ser Ile Pro Thr Asn Gly  
290 295 300

Asp Gly Val Gln Gly Tyr Lys Leu His Ile Ile Tyr Lys His Lys  
305 310 315

<210> 33  
<211> 629  
<212> PRT

<213> Escherichia coli

<400> 33

Met Lys Lys Val Leu Thr Leu Ser Leu Leu Ala Leu Cys Val Ser His  
1 5 10 15

Ser Ala Val Ala Ala Asn Tyr Thr Phe Asn Asn Asp Asn Ile Ala Leu  
20 25 30

Ser Phe Asp Asp Thr Asn Ser Thr Ile Val Leu Lys Asp Arg Arg Thr  
35 40 45

Asn His Pro Ile Thr Pro Gln Glu Leu Phe Phe Leu Thr Leu Pro Asp  
50 55 60

Glu Thr Lys Ile His Thr Ala Asp Phe Lys Ile Lys His Ile Lys Lys  
65 70 75 80

Gln Asp Asn Ala Ile Val Ile Asp Phe Thr Arg Pro Asp Phe Asn Val  
85 90 95

Thr Val Gln Leu Asn Leu Val Lys Gly Lys Tyr Ala Ser Ile Asp Tyr  
100 105 110

Thr Ile Ala Ala Val Gly Gln Pro Arg Asp Val Ala Lys Ile Thr Phe  
115 120 125

Phe Pro Thr Lys Lys Gln Phe Gln Ala Pro Tyr Val Asp Gly Ala Ile  
130 135 140

Thr Ser Ser Pro Ile Ile Ala Asp Ser Phe Phe Ile Leu Pro Asn Lys  
145 150 155 160

Pro Ile Val Asn Thr Tyr Ala Tyr Glu Ala Thr Thr Asn Leu Asn Val  
165 170 175

Glu Leu Lys Thr Pro Ile Gln Pro Glu Thr Pro Val Ser Phe Thr Thr  
180 185 190

Trp Phe Gly Thr Phe Pro Glu Thr Ser Gln Leu Arg Arg Ser Val Asn  
195 200 205

Gln Phe Ile Asn Ala Val Arg Pro Arg Pro Tyr Lys Pro Tyr Leu His  
210 215 220

Tyr Asn Ser Trp Met Asp Ile Gly Phe Phe Thr Pro Tyr Thr Glu Gln  
225 230 235 240

Asp Val Leu Gly Arg Met Asp Glu Trp Asn Lys Glu Phe Ile Ser Gly  
245 250 255

Arg Gly Val Ala Leu Asp Ala Phe Leu Leu Asp Asp Gly Trp Asp Asp  
260 265 270

Leu Thr Gly Arg Trp Leu Phe Gly Pro Ala Phe Ser Asn Gly Phe Ser  
275 280 285

Lys Val Arg Glu Lys Ala Asp Ser Leu His Ser Ser Val Gly Leu Trp  
290 295 300

Leu Ser Pro Trp Gly Gly Tyr Asn Lys Pro Gln Arg Arg Ser Arg Phe  
305 310 315 320

Ala Cys Lys Arg Val Trp Val Arg Asn Arg Gly Arg Gln Ala Gly Ala  
325 330 335

Phe Gly Ser Glu Leu Leu Lys Asn Phe Asn Glu Gln Ile Ile Asn Leu  
340 345 350

Ile Lys Asn Glu His Ile Thr Ser Phe Lys Leu Asp Gly Met Gly Asn  
355 360 365

Ala Ser Ser His Ile Lys Gly Ser Pro Phe Ala Ser Asp Phe Asp Ala  
370 375 380

Ser Ile Ala Leu Leu His Asn Met Arg Arg Ala Asn Pro Asn Leu Phe  
385 390 395 400

Ile Asn Leu Thr Thr Gly Thr Asn Ala Ser Pro Ser Trp Leu Phe Tyr  
405 410 415

Ala Asp Ser Ile Trp Arg Gln Gly Asp Asp Ile Asn Leu Tyr Gly Pro  
420 425 430

Gly Thr Pro Val Gln Gln Trp Ile Thr Tyr Arg Asp Ala Glu Thr Tyr  
435 440 445

Arg Ser Ile Val Arg Lys Gly Pro Leu Phe Pro Leu Asn Ser Leu Met  
450 455 460

Tyr His Gly Ile Val Ser Ala Glu Asn Ala Tyr Tyr Gly Leu Glu Lys  
465 470 475 480

Val Gln Thr Asp Ser Asp Phe Ala Asp Gln Val Trp Ser Tyr Phe Ala  
485 490 495

Thr Gly Thr Gln Leu Gln Glu Leu Tyr Ile Thr Pro Ser Met Leu Asn  
500 505 510

Lys Val Lys Trp Asp Thr Leu Ala Lys Ala Ala Lys Trp Ser Lys Glu  
515 520 525

Asn Ala Ser Val Leu Val Asp Thr His Trp Ile Gly Gly Asp Pro Thr

530

535

540

Ala Leu Ala Val Tyr Gly Trp Ala Ser Trp Ser Lys Asp Lys Ala Ile  
 545 550 555 560

Leu Gly Leu Arg Asn Pro Ser Asp Lys Pro Gln Thr Tyr Tyr Leu Asp  
 565 570 575

Leu Ala Lys Asp Phe Glu Ile Pro Ala Gly Asn Ala Ala Gln Phe Ser  
 580 585 590

Leu Lys Ala Val Tyr Gly Ser Asn Lys Thr Val Pro Val Glu Tyr Lys  
 595 600 605

Asn Ala Thr Val Ile Thr Leu Gln Pro Leu Glu Thr Leu Val Phe Glu  
 610 615 620

Ala Val Thr Ile Asn  
 625

<210> 34  
 <211> 1778  
 <212> PRT

<213> Escherichia coli

<400> 34

Met Asn Lys Ile Phe Lys Val Ile Trp Asn Pro Ala Thr Gly Ser Tyr  
 1 5 10 15

Thr Val Ala Ser Glu Thr Ala Lys Ser Arg Gly Lys Lys Ser Gly Arg  
 20 25 30

Ser Lys Leu Leu Ile Ser Ala Leu Val Ala Gly Gly Leu Leu Ser Ser  
 35 40 45

Phe Gly Ala Ser Ala Asp Asn Tyr Thr Gly Gln Pro Thr Asp Tyr Gly  
 50 55 60

Asp Gly Ser Ala Gly Asp Gly Trp Val Ala Ile Gly Lys Gly Ala Lys  
 65 70 75 80

Ala Asn Thr Phe Met Asn Thr Ser Gly Ala Ser Thr Ala Leu Gly Tyr  
 85 90 95



Asp Ala Ile Ala Glu Gly Glu Tyr Ser Ser Ala Ile Gly Ser Lys Thr  
100 105 110

Leu Ala Thr Gly Gly Ala Ser Met Ala Phe Gly Val Ser Ala Lys Ala  
115 120 125

Met Gly Asp Arg Ser Val Ala Leu Gly Ala Ser Ser Val Ala Asn Gly  
130 135 140

Asp Arg Ser Met Ala Phe Gly Arg Tyr Ala Lys Thr Asn Gly Phe Thr  
145 150 155 160

Ser Leu Ala Ile Gly Asp Ser Ser Leu Ala Asp Gly Glu Lys Thr Ile  
165 170 175

Ala Leu Gly Asn Thr Ala Lys Ala Tyr Glu Ile Met Ser Ile Ala Leu  
180 185 190

Gly Asp Asn Ala Asn Ala Ser Lys Glu Tyr Ala Met Ala Leu Gly Ala  
195 200 205

Ser Ser Lys Ala Gly Gly Ala Asp Ser Leu Ala Phe Gly Arg Lys Ser  
210 215 220

Thr Ala Asn Ser Thr Gly Ser Leu Ala Ile Gly Ala Asp Ser Ser Ser  
225 230 235 240

Ser Asn Asp Asn Ala Ile Ala Ile Gly Asn Lys Thr Gln Ala Leu Gly  
245 250 255

Val Asn Ser Met Ala Leu Gly Asn Ala Ser Gln Ala Ser Gly Glu Ser  
260 265 270

Ser Ile Ala Leu Gly Asn Thr Ser Glu Ala Ser Glu Gln Asn Ala Ile  
275 280 285

Ala Leu Gly Gln Gly Ser Ile Ala Ser Lys Val Asn Ser Ile Ala Leu  
290 295 300

Gly Ser Asn Ser Leu Ser Ser Gly Glu Asn Ala Ile Ala Leu Gly Glu  
305 310 315 320

Gly Ser Ala Ala Gly Gly Ser Asn Ser Leu Ala Phe Gly Ser Gln Ser  
325 330 335

Arg Ala Asn Gly Asn Asp Ser Val Ala Ile Gly Val Gly Ala Ala Ala  
340 345 350

Ala Thr Asp Asn Ser Val Ala Ile Gly Ala Gly Ser Thr Thr Asp Ala  
355 360 365

Ser Asn Thr Val Ser Val Gly Asn Ser Ala Thr Lys Arg Lys Ile Val  
370 375 380

Asn Met Ala Ala Gly Ala Ile Ser Asn Thr Ser Thr Asp Ala Ile Asn  
385 390 395 400

Gly Ser Gln Leu Tyr Thr Ile Ser Asp Ser Val Ala Lys Arg Leu Gly  
405 410 415

Gly Gly Ala Thr Val Gly Ser Asp Gly Thr Val Thr Ala Val Ser Tyr  
420 425 430

Ala Leu Arg Ser Gly Thr Tyr Asn Asn Val Gly Asp Ala Leu Ser Gly  
435 440 445

Ile Asp Asn Asn Thr Leu Gln Trp Asn Lys Thr Ala Gly Ala Phe Ser  
450 455 460

Ala Asn His Gly Ala Asn Ala Thr Asn Lys Ile Thr Asn Val Ala Lys  
465 470 475 480

Gly Thr Val Ser Ala Thr Ser Thr Asp Val Val Asn Gly Ser Gln Leu  
485 490 495

Tyr Asp Leu Gln Gln Asp Ala Leu Leu Trp Asn Gly Thr Ala Phe Ser  
500 505 510

Ala Ala His Gly Thr Glu Ala Thr Ser Lys Ile Thr Asn Val Thr Ala  
515 520 525

Gly Asn Leu Thr Ala Gly Ser Thr Asp Ala Val Asn Gly Ser Gln Leu  
530 535 540

Lys Thr Thr Asn Asp Asn Val Thr Thr Asn Thr Thr Asn Ile Ala Thr  
545 550 555 560

Asn Thr Thr Asn Ile Thr Asn Leu Thr Asp Ala Val Asn Gly Leu Gly  
565 570 575

Asp Asp Ser Leu Leu Trp Asn Lys Ala Ala Gly Ala Phe Ser Ala Ala  
580 585 590

His Gly Thr Glu Ala Thr Ser Lys Ile Thr Asn Val Thr Ala Gly Asn  
595 600 605

Leu Thr Ala Gly Ser Thr Asp Ala Val Asn Gly Ser Gln Leu Lys Thr  
610 615 620

Thr Asn Asp Asn Val Thr Thr Asn Thr Thr Asn Ile Ala Thr Asn Thr  
625 630 635 640

Thr Asn Ile Thr Asn Leu Thr Asp Ala Val Asn Gly Leu Gly Asp Asp  
645 650 655

Ser Leu Leu Trp Asn Lys Thr Ala Gly Ala Phe Ser Ala Ala His Gly  
660 665 670

Thr Asp Ala Thr Ser Lys Ile Thr Asn Val Thr Ala Gly Asn Leu Thr  
675 680 685

Ala Gly Ser Thr Asp Ala Val Asn Gly Ser Gln Leu Lys Thr Thr Asn  
690 695 700

Asp Asn Val Thr Thr Asn Thr Thr Asn Ile Ala Thr Asn Thr Thr Asn  
705 710 715 720

Ile Thr Asn Leu Thr Asp Ala Val Asn Gly Leu Gly Asp Asp Ser Leu  
725 730 735

Leu Trp Asn Lys Thr Ala Gly Ala Phe Ser Ala Ala His Gly Thr Asp  
740 745 750

Ala Thr Ser Lys Ile Thr Asn Val Lys Ala Gly Asp Leu Thr Ala Gly  
755 760 765

Ser Thr Asp Ala Val Asn Gly Ser Gln Leu Lys Thr Thr Asn Asp Asn

770

775

780

Val Ser Thr Asn Thr Thr Asn Ile Thr Asn Leu Thr Asp Ala Val Asn  
785 790 795 800

Gly Leu Gly Asp Asp Ser Leu Leu Trp Asn Lys Thr Ala Gly Ala Phe  
805 810 815

Ser Ala Ala His Gly Thr Asp Ala Thr Ser Lys Ile Thr Asn Val Lys  
820 825 830

Ala Gly Asp Leu Thr Ala Gly Ser Thr Asp Ala Val Asn Gly Ser Gln  
835 840 845

Leu Lys Thr Thr Asn Asp Asn Val Ser Thr Asn Thr Thr Asn Ile Thr  
850 855 860

Asn Leu Thr Asp Ser Val Gly Asp Leu Lys Asp Asp Ser Leu Leu Trp  
865 870 875 880

Asn Lys Ala Ala Gly Ala Phe Ser Ala Ala His Gly Thr Glu Ala Thr  
885 890 895

Ser Lys Ile Thr Asn Leu Leu Ala Gly Lys Ile Ser Ser Asn Ser Thr  
900 905 910

Asp Ala Ile Asn Gly Ser Gln Leu Tyr Gly Val Ala Asp Ser Phe Thr  
915 920 925

Ser Tyr Leu Gly Gly Gly Ala Asp Ile Ser Asp Thr Gly Val Leu Ser  
930 935 940

Gly Pro Thr Tyr Thr Ile Gly Gly Thr Asp Tyr Thr Asn Val Gly Asp  
945 950 955 960

Ala Leu Ala Ala Ile Asn Thr Ser Phe Ser Thr Ser Leu Gly Asp Ala  
965 970 975

Leu Leu Trp Asp Ala Thr Ala Gly Lys Phe Ser Ala Lys His Gly Ile  
980 985 990

Asn Asn Ala Pro Ser Val Ile Thr Asp Val Ala Asn Gly Ala Val Ser  
995 1000 1005

Ser Thr Ser Ser Asp Ala Ile Asn Gly Ser Gln Leu Tyr Gly Val  
1010 1015 1020

Ser Asp Tyr Ile Ala Asp Ala Leu Gly Gly Asn Ala Val Val Asn  
1025 1030 1035

Thr Asp Gly Ser Ile Thr Thr Pro Thr Tyr Ala Ile Ala Gly Gly  
1040 1045 1050

Ser Tyr Asn Asn Val Gly Asp Ala Leu Glu Ala Ile Asp Thr Thr  
1055 1060 1065

Leu Asp Asp Ala Leu Leu Trp Asp Thr Thr Ala Asn Gly Gly Asn  
1070 1075 1080

Gly Ala Phe Ser Ala Ala His Gly Lys Asp Lys Thr Ala Ser Val  
1085 1090 1095

Ile Thr Asn Val Ala Asn Gly Ala Val Ser Ala Thr Ser Asn Asp  
1100 1105 1110

Ala Ile Asn Gly Ser Gln Leu Tyr Ser Thr Asn Lys Tyr Ile Ala  
1115 1120 1125

Asp Ala Leu Gly Gly Asp Ala Glu Val Asn Ala Asp Gly Thr Ile  
1130 1135 1140

Thr Ala Pro Thr Tyr Thr Ile Ala Asn Thr Asp Tyr Asn Asn Val  
1145 1150 1155

Gly Glu Ala Leu Asp Ala Leu Asp Asn Asn Ala Leu Leu Trp Asp  
1160 1165 1170

Glu Asp Ala Gly Ala Tyr Asn Ala Ser His Asp Gly Asn Ala Ser  
1175 1180 1185

Lys Ile Thr Asn Val Ala Ala Gly Asp Leu Ser Thr Thr Ser Thr  
1190 1195 1200

Asp Ala Val Asn Gly Ser Gln Leu Asn Ala Thr Asn Ile Leu Val  
1205 1210 1215

Thr	Gln	Asn	Ser	Gln	Met	Ile	Asn	Gln	Leu	Ala	Gly	Asn	Thr	Ser
1220						1225					1230			
Glu	Thr	Tyr	Ile	Glu	Glu	Asn	Gly	Ala	Gly	Ile	Asn	Tyr	Val	Arg
1235						1240					1245			
Thr	Asn	Asp	Ser	Gly	Leu	Ala	Phe	Asn	Asp	Ala	Ser	Ala	Ser	Gly
1250						1255					1260			
Ile	Gly	Ala	Thr	Ala	Val	Gly	Tyr	Asn	Ala	Val	Ala	Ser	His	Ala
1265						1270					1275			
Ser	Ser	Val	Ala	Ile	Gly	Gln	Asp	Ser	Ile	Ser	Glu	Val	Asp	Thr
1280						1285					1290			
Gly	Ile	Ala	Leu	Gly	Ser	Ser	Ser	Val	Ser	Ser	Arg	Val	Ile	Val
1295						1300					1305			
Lys	Gly	Thr	Arg	Asn	Thr	Ser	Val	Ser	Glu	Glu	Gly	Val	Val	Ile
1310						1315					1320			
Gly	Tyr	Asp	Thr	Thr	Asp	Gly	Glu	Leu	Leu	Gly	Ala	Leu	Ser	Ile
1325						1330					1335			
Gly	Asp	Asp	Gly	Lys	Tyr	Arg	Gln	Ile	Ile	Asn	Val	Ala	Asp	Gly
1340						1345					1350			
Ser	Glu	Ala	His	Asp	Ala	Val	Thr	Val	Arg	Gln	Leu	Gln	Asn	Ala
1355						1360					1365			
Ile	Gly	Ala	Val	Ala	Thr	Thr	Pro	Thr	Lys	Tyr	Tyr	His	Ala	Asn
1370						1375					1380			
Ser	Thr	Ala	Glu	Asp	Ser	Leu	Ala	Val	Gly	Glu	Asp	Ser	Leu	Ala
1385						1390					1395			
Met	Gly	Ala	Lys	Thr	Ile	Val	Asn	Gly	Asn	Ala	Gly	Ile	Gly	Ile
1400						1405					1410			
Gly	Leu	Asn	Thr	Leu	Val	Leu	Ala	Asp	Ala	Ile	Asn	Gly	Ile	Ala
1415						1420					1425			

Ile Gly Ser Asn Ala Arg Ala Asn His Ala Asp Ser Ile Ala Met  
1430 1435 1440

Gly Asn Gly Ser Gln Thr Thr Arg Gly Ala Gln Thr Asn Tyr Thr  
1445 1450 1455

Ala Tyr Asn Met Asp Ala Pro Gln Asn Ser Val Gly Glu Phe Ser  
1460 1465 1470

Val Gly Ser Glu Asp Gly Gln Arg Gln Ile Thr Asn Val Ala Ala  
1475 1480 1485

Gly Ser Ala Asp Thr Asp Ala Val Asn Val Gly Gln Leu Lys Val  
1490 1495 1500

Thr Asp Ala Gln Val Ser Gln Asn Thr Gln Ser Ile Thr Asn Leu  
1505 1510 1515

Asn Thr Gln Val Thr Asn Leu Asp Thr Arg Val Thr Asn Ile Glu  
1520 1525 1530

Asn Gly Ile Gly Asp Ile Val Thr Thr Gly Ser Thr Lys Tyr Phe  
1535 1540 1545

Lys Thr Asn Thr Asp Gly Ala Asp Ala Asn Ala Gln Gly Lys Asp  
1550 1555 1560

Ser Val Ala Ile Gly Ser Gly Ser Ile Ala Ala Ala Asp Asn Ser  
1565 1570 1575

Val Ala Leu Gly Thr Gly Ser Val Ala Asp Glu Glu Asn Thr Ile  
1580 1585 1590

Ser Val Gly Ser Ser Thr Asn Gln Arg Arg Ile Thr Asn Val Ala  
1595 1600 1605

Ala Gly Val Asn Ala Thr Asp Ala Val Asn Val Ser Gln Leu Lys  
1610 1615 1620

Ser Ser Glu Ala Gly Gly Val Arg Tyr Asp Thr Lys Ala Asp Gly  
1625 1630 1635

Ser Ile Asp Tyr Ser Asn Ile Thr Leu Gly Gly Gly Asn Ser Gly

1640

1645

1650

Thr Thr Arg Ile Ser Asn Val Ser Ala Gly Val Asn Asn Asn Asp  
 1655 1660 1665

Ala Val Asn Tyr Ala Gln Leu Lys Gln Ser Val Gln Glu Thr Lys  
 1670 1675 1680

Gln Tyr Thr Asp Gln Arg Met Val Glu Met Asp Asn Lys Leu Ser  
 1685 1690 1695

Lys Thr Glu Ser Lys Leu Ser Gly Gly Ile Ala Ser Ala Met Ala  
 1700 1705 1710

Met Thr Gly Leu Pro Gln Ala Tyr Thr Pro Gly Ala Ser Met Ala  
 1715 1720 1725

Ser Ile Gly Gly Gly Thr Tyr Asn Gly Glu Ser Ala Val Ala Leu  
 1730 1735 1740

Gly Val Ser Met Val Ser Ala Asn Gly Arg Trp Val Tyr Lys Leu  
 1745 1750 1755

Gln Gly Ser Thr Asn Ser Gln Gly Glu Tyr Ser Ala Ala Leu Gly  
 1760 1765 1770

Ala Gly Ile Gln Trp  
 1775

&lt;210&gt; 35

&lt;211&gt; 227

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 35

Met Asn Leu Lys Lys Thr Leu Leu Ser Val Leu Met Ile Leu Gln Leu  
 1 5 10 15

Cys Leu Leu Val Gly Cys Asp Tyr Ile Glu Lys Ala Ser Lys Val Asp  
 20 25 30

Asp Leu Val Thr Gln Gln Glu Leu Gln Lys Ser Lys Ile Glu Ala Leu  
 35 40 45



Glu Lys Gln Gln Glu Leu Asp Lys Arg Lys Ile Glu His Phe Glu Lys  
50 55 60

Gln Gln Thr Thr Ile Ile Asn Ser Thr Lys Thr Leu Ala Gly Val Val  
65 70 75 80

Lys Ala Val Lys Asn Lys Gln Asp Glu Phe Val Phe Thr Glu Phe Asn  
85 90 95

Pro Ala Gln Thr Gln Tyr Phe Ile Leu Asn Asn Gly Ser Val Gly Leu  
100 105 110

Ala Gly Lys Ile Leu Ser Ile Asp Ala Val Glu Asn Gly Ser Val Ile  
115 120 125

Arg Ile Ser Leu Val Asn Leu Leu Ser Val Pro Val Ser Asn Met Gly  
130 135 140

Phe Tyr Ala Thr Trp Gly Gly Glu Lys Pro Thr Asp Ile Asn Ala Leu  
145 150 155 160

Ala Lys Trp Gln Gln Leu Leu Phe Ser Thr Ala Met Asn Ser Ser Leu  
165 170 175

Lys Leu Leu Pro Gly Gln Trp Gln Asp Ile Asn Leu Thr Leu Lys Gly  
180 185 190

Val Ser Pro Asn Asn Leu Lys Tyr Leu Lys Leu Ala Ile Asn Met Ala  
195 200 205

Asn Ile Gln Phe Asp Arg Leu Gln Pro Ala Glu Ser Pro Gln Arg Lys  
210 215 220

Asn Lys Lys  
225

<210> 36  
<211> 1109  
<212> PRT

<213> Escherichia coli

<400> 36

Met Lys Arg Val Val Arg Leu Leu Gly Val Gly Leu Leu Leu Leu Val  
1 5 10 15

Val Leu Leu Leu Ile Leu Phe Val Leu Ala Gln Thr Thr Pro Leu Ile  
20 25 30

Ser Ala Gln Asp Glu His Ala Val Trp Leu Arg Leu Leu Ile Thr Ala  
35 40 45

Ile Val Ile Cys Leu Leu Ser Met Cys Ile Phe Phe Leu Phe Ser Phe  
50 55 60

Arg Gln Asn Glu Ala Ser Thr Ile Ser Leu Tyr Ala Gln Pro Thr Asp  
65 70 75 80

Ile Lys Glu Ile Asn Thr Glu Gln Pro Asn Tyr Ala Ser Leu Leu Thr  
85 90 95

Ile Tyr Leu Arg Asp Arg Tyr Gly Pro Phe Trp Arg Arg Lys Val Arg  
100 105 110

Leu Leu Leu Val Thr Gly Glu Pro Glu Gln Ala Glu Ala Ile Ala Pro  
115 120 125

Gly Leu Thr Gly Gln His Trp Leu Glu Gly Asp His Thr Val Leu Ile  
130 135 140

Tyr Gly Gly Arg Pro Thr Ala Glu Pro Asp Val Thr Leu Leu Thr Ala  
145 150 155 160

Leu Lys Lys Leu Arg Arg Ser Arg Pro Leu Asp Gly Ile Ile Trp Ala  
165 170 175

Leu Thr Glu Glu Gln Ser Arg Gln Thr Ala Gln Leu Asp Lys Gly Trp  
180 185 190

Arg Gly Leu Ile Asn Gly Gly Lys Arg Leu Gly Phe Gln Ala Pro Leu  
195 200 205

Tyr Leu Trp Gln Val Cys Asp Asp Gly Asp Tyr Gln Thr Gly Arg Pro  
210 215 220

Leu Gln Ser Val Gly Cys Leu Leu Pro Glu Arg Cys Thr Pro Glu Gln  
225 230 235 240

Leu Ala Val Met Leu Glu Ala Ala Ala Asp Gly Thr Gly His Val Ala  
245 250 255

Ala Thr Asp Arg Tyr Arg Met Phe Ser Ala Ala Ser Gly Ser Tyr Pro  
260 265 270

Cys Arg Ala Gly Tyr Cys Ser Leu Ala Asp Arg Pro Glu Thr Ala Ala  
275 280 285

Gly Arg Arg Arg Ile Phe Phe Pro Ala Pro Ala Arg Pro Asp Val Gln  
290 295 300

Pro Ala Ala Cys Arg Arg Ala Gly Gly Gln His Leu Met Gln Trp Leu  
305 310 315 320

Pro Ser Pro Val Trp Ala Gly Val Thr Val Ile Thr Arg Ala Gly Ala  
325 330 335

Arg Trp Val Phe Leu Trp Leu Arg Thr Ala Leu Met Ser Ala Val Cys  
340 345 350

Val Leu Val Ile Trp Gly Ala Gly Met Thr Thr Ser Phe Phe Ala Asn  
355 360 365

Arg Ala Leu Val Gln Glu Thr Gly Ile Gln Thr Ala Arg Ala Leu Asp  
370 375 380

Thr Arg Leu Pro Leu Ala Glu Gln Leu Val Ala Leu His Thr Leu Gln  
385 390 395 400

Gly Glu Leu Glu Arg Leu Gln Tyr Arg Ile Arg Glu Gly Ala Pro Trp  
405 410 415

Tyr Gln Arg Phe Gly Leu Glu Arg Asn Gln Gln Leu Leu Ala Ala Ala  
420 425 430

Phe Pro Gly Tyr Ala Gln Ala Ala Asn Arg Leu Val Arg Asp Val Ala  
435 440 445

Val Asp His Leu Gln Gln Gln Leu Asn Ala Phe Val Ala Leu Pro Pro

450

455

460

Asn Ser Pro Gln Arg Thr Ala Thr Gly Glu Gln Arg Tyr Lys Gln Leu  
465 470 475 480

Lys Ala Leu Leu Met Thr Ser Arg Pro Glu Lys Ala Asp Ala Ala Phe  
485 490 495

Phe Ser Thr Thr Leu Met Ala Asp Gly Leu Arg Tyr Glu Asn Ile Pro  
500 505 510

Glu Gly Val Arg Gln Ser Val Leu Pro Ser Leu Leu Thr Phe Trp Thr  
515 520 525

Ala Asn Leu Pro Glu His Pro Gln Trp Lys Thr Ser Pro Pro Pro Glu  
530 535 540

Leu Thr Gly Ala Val Arg Lys Ile Leu Leu Arg Gln Ile Gly Val Arg  
545 550 555 560

Asn Ala Glu Asn Thr Leu Tyr Gln Asn Val Leu Gln Gln Val Ser Arg  
565 570 575

Asn Tyr Ala Asp Met Thr Leu Ala Asp Met Thr Gly Asp Thr Leu Thr  
580 585 590

Glu Ser Leu Phe Ser Thr Glu Gln Thr Val Pro Gly Met Phe Thr Arg  
595 600 605

Gln Ala Trp Glu Gly Gln Val Arg Glu Ala Ile Glu Gln Val Val Thr  
610 615 620

Ala Arg Arg Glu Glu Ile Asp Trp Val Leu Ser Asp Arg Gln Gln Asp  
625 630 635 640

Thr Ser Ala Asp Ile Ser Pro Asp Thr Leu Arg Asn Arg Leu Thr Ser  
645 650 655

Arg Tyr Phe Thr Asp Phe Ala Gly Ser Trp Leu Ala Phe Leu Asn Ser  
660 665 670

Ile His Trp Lys Lys Glu Asp Ser Leu Ser Gly Ile Leu Asp Gln Leu  
675 680 685

Thr Leu Met Ala Asp Ala Arg Gln Ser Pro Leu Ile Ala Leu Thr Asp  
690 695 700

Thr Leu Ala Trp Gln Ala Ala Thr Gly Arg Glu Asn Arg Gly Leu Ser  
705 710 715 720

Asp Ser Leu Ala Lys Ser Ala Gln Glu Leu Phe Asn Gly Lys Glu Lys  
725 730 735

Thr Pro Gln Gln Ser Arg Glu Gly Asp Asp Val Pro Val Gly Pro Leu  
740 745 750

Asp Lys Thr Phe Thr Pro Leu Leu Arg Leu Leu Gly Asp Lys Ala Gly  
755 760 765

Gly Gly Asp Ser Gln Leu Ser Leu Gln Thr Tyr Leu Thr Arg Val Thr  
770 775 780

Arg Val Arg Leu Lys Leu Gln Gln Val Thr Asn Ala Pro Asp Pro Gln  
785 790 795 800

Glu Met Thr Gln Gln Leu Ala Gln Thr Val Leu Gln Gly Lys Thr Val  
805 810 815

Asp Leu Thr Asp Thr Arg Asp Tyr Gly Arg Leu Ile Ala Ala Ser Leu  
820 825 830

Gly Glu Glu Trp Ser Gly Phe Gly Gln Ala Leu Phe Val Arg Pro Val  
835 840 845

Glu Gln Ser Trp Arg Gln Val Leu Thr Pro Ala Ala Asp Ser Leu Asn  
850 855 860

Arg Gln Trp Gln Arg Ala Ile Val Ser His Trp Asn Gln Asp Phe Ala  
865 870 875 880

Gly Arg Tyr Pro Phe Lys Ala Ser Gln Asn Asp Ala Ser Leu Pro Leu  
885 890 895

Leu Ala Gln Tyr Leu Arg Asp Asp Gly Arg Ile Asn Leu Phe Ile Ala  
900 905 910

Ala Asn Leu Ser Gly Val Leu Lys Arg Glu Gly Arg Tyr Trp Val Ala  
915 920 925

Asp Ala Met Asn Thr Gln Gly Leu Thr Val Asn Pro Asp Phe Ile Arg  
930 935 940

Ala Leu Asn Arg Leu Arg Asp Val Ala Asp Thr Ala Phe Ala Ser Gly  
945 950 955 960

Asp Ala Gly Ile His Phe Glu Leu Arg Ala Lys Pro Ala Arg Asp Val  
965 970 975

Met Lys Thr His Leu Val Ile Asp Gly Gln Glu Leu Glu Tyr Phe Asn  
980 985 990

Gln Lys Glu Arg Trp Gln Arg Phe Asn Trp Pro Asp Glu Gln Trp Gln  
995 1000 1005

Pro Gly Ala Ser Leu Ser Trp Thr Ser Thr Gln Ala Met Glu Arg  
1010 1015 1020

Ile Leu Ala Asp Tyr Arg Gly Ser Trp Ser Leu Ile Arg Leu Leu  
1025 1030 1035

Glu Gln Ala Gln Val Thr Pro Val Asp Ser Ser Thr Phe Lys Val  
1040 1045 1050

Val Trp Lys Ala Gln Asp Gly Leu Pro Leu Asn Tyr Leu Leu Arg  
1055 1060 1065

Val Glu Gln Gly Lys Gly Pro Leu Ala Leu Leu Glu Leu Lys Asn  
1070 1075 1080

Phe Arg Leu Pro Gly Gln Val Phe Leu Thr Gly Lys Ser Met Lys  
1085 1090 1095

Asp Val Glu Glu Tyr Gly Glu Asp Ala Asp Glu  
1100 1105

<210> 37  
<211> 178  
<212> PRT

<213> Escherichia coli

<400> 37

Met Phe Pro Ile Arg Phe Lys Arg Pro Ala Leu Leu Cys Met Ala Met  
1 5 10 15

Leu Thr Val Val Leu Ser Gly Cys Gly Leu Ile Gln Lys Val Val Asp  
20 25 30

Glu Ser Lys Ser Val Ala Ser Ala Val Phe Tyr Lys Gln Ile Lys Ile  
35 40 45

Leu His Leu Asp Phe Phe Ser Arg Ser Ala Leu Asn Thr Asp Ala Glu  
50 55 60

Asp Thr Pro Leu Ser Thr Met Val His Val Trp Gln Leu Lys Thr Arg  
65 70 75 80

Glu Asp Phe Asp Lys Ala Asp Tyr Asp Thr Leu Phe Met Gln Glu Glu  
85 90 95

Lys Thr Leu Glu Lys Asp Val Leu Ala Lys His Thr Val Trp Val Lys  
100 105 110

Pro Glu Gly Thr Ala Ser Leu Asn Val Pro Leu Asp Lys Glu Thr Gln  
115 120 125

Phe Val Ala Ile Ile Gly Gln Phe Tyr His Pro Asp Glu Lys Ser Asp  
130 135 140

Ser Trp Arg Leu Val Ile Lys Arg Asp Glu Leu Glu Ala Asp Lys Pro  
145 150 155 160

Arg Ser Ile Glu Leu Met Arg Ser Asp Leu Arg Leu Leu Pro Leu Lys  
165 170 175

Asp Lys

<210> 38

<211> 280

<212> PRT

<213> Escherichia coli

<400> 38

Met Ile Ser Gly Gly Asn Met Leu Lys Glu Trp Met Ile Phe Thr Cys  
1 5 10 15

Ser Leu Leu Thr Leu Ala Gly Ala Ser Leu Pro Leu Ser Gly Cys Ile  
20 25 30

Ser Arg Gly Gln Glu Ser Ile Ser Glu Gly Ala Ala Phe Gly Ala Gly  
35 40 45

Ile Leu Arg Glu Pro Gly Ala Thr Lys Lys Ala Asp Thr Lys Asp Leu  
50 55 60

Asn Val Pro Pro Pro Val Tyr Gly Pro Pro Gln Val Ile Phe Arg Ile  
65 70 75 80

Asp Asp Asn Arg Tyr Phe Thr Leu Glu Asn Tyr Thr His Cys Glu Asn  
85 90 95

Gly Gln Thr Phe Tyr Asn Asn Lys Ala Lys Asn Ile His Val Lys Ile  
100 105 110

Leu Asp Ala Ser Gly Tyr Leu Phe Lys Gly Arg Leu Phe Trp Leu Ser  
115 120 125

Thr Arg Asp Asp Phe Leu Ala Phe Pro Ala Thr Leu Asn Thr Arg His  
130 135 140

Ala Ser Cys Met Gly Ser Asn Lys Gly Cys Met Asn Ala Val Ile Val  
145 150 155 160

Thr Thr Asp Gly Gly Lys Arg Arg Ser Gly Val Pro Tyr Gly Ser Tyr  
165 170 175

Thr Gln Asn Pro Thr Gly Ala Thr Arg Asp Tyr Asp Met Leu Val Met  
180 185 190

Asn Asp Gly Phe Tyr Leu Leu Arg Tyr Arg Gly Gly Gln Gly Arg Phe  
195 200 205

Ser Pro Val Ile Leu Arg Trp Ile Leu Ser Thr Glu Asp Ser Ser Gly  
210 215 220



Val Val Arg Ser Glu Asp Ala Tyr Glu Leu Phe Arg Pro Gly Glu Glu  
225 230 235 240

Val Pro Ser Thr Gly Phe Tyr Lys Ile Asp Leu Ser Arg Phe Tyr Pro  
245 250 255

Lys Asn Asn Val Met Glu Met Gln Cys Asp Arg Thr Leu Glu Pro Val  
260 265 270

Gln Pro Ser Glu Ser Lys Ile Gln  
275 280

<210> 39  
<211> 501  
<212> PRT

<213> Escherichia coli

<400> 39

Met Glu His Val Ser Ile Lys Thr Leu Tyr His Leu Leu Cys Cys Met  
1 5 10 15

Leu Leu Phe Ile Ser Ala Met Cys Ala Leu Ala Gln Glu His Glu Pro  
20 25 30

Ile Gly Ala Gln Asp Glu Arg Leu Ser Thr Leu Ile His Gln Arg Met  
35 40 45

Gln Glu Ala Lys Val Pro Ala Leu Ser Val Ser Val Thr Ile Lys Gly  
50 55 60

Val Arg Gln Arg Phe Val Tyr Gly Val Ala Asp Val Ala Ser Gln Lys  
65 70 75 80

Ala Asn Thr Leu Asp Thr Val Tyr Glu Leu Gly Ser Met Ser Lys Ala  
85 90 95

Phe Thr Gly Leu Val Val Gln Ile Leu Ile Gln Glu Gly Arg Leu Arg  
100 105 110

Gln Gly Asp Asp Ile Ile Thr Tyr Leu Pro Glu Met Arg Leu Asn Tyr  
115 120 125

Gln Gly Lys Pro Ala Ser Leu Thr Val Ala Asp Phe Leu Tyr His Thr  
130 135 140

Ser Gly Leu Pro Phe Ser Thr Leu Ala Arg Leu Glu Asn Pro Met Pro  
145 150 155 160

Gly Ser Ala Val Ala Gln Gln Leu Arg Asn Glu Asn Leu Leu Phe Ala  
165 170 175

Pro Gly Ala Lys Phe Ser Tyr Ala Ser Ala Asn Tyr Asp Val Leu Gly  
180 185 190

Ala Val Ile Glu Asn Val Thr Gly Lys Thr Phe Thr Glu Val Ile Ala  
195 200 205

Glu Arg Leu Thr Gln Pro Leu Gly Met Ser Ala Thr Val Ala Val Lys  
210 215 220

Gly Asp Glu Ile Ile Val Asn Lys Ala Ser Gly Tyr Lys Leu Gly Phe  
225 230 235 240

Gly Lys Pro Val Leu Phe His Ala Pro Leu Ala Arg Asn His Val Pro  
245 250 255

Ala Ala Tyr Ile His Ser Thr Leu Pro Asp Met Glu Ile Trp Ile Asp  
260 265 270

Ala Trp Leu His Arg Lys Ala Leu Pro Ala Thr Leu Arg Glu Ala Met  
275 280 285

Ser Asn Ser Trp Arg Gly Asn Ser Asp Val Pro Leu Ala Ala Asp Asn  
290 295 300

Arg Ile Leu Tyr Ala Ser Gly Trp Phe Ile Asp Gln Asn Gln Gly Pro  
305 310 315 320

Tyr Ile Ser His Gly Gly Gln Asn Pro Asn Phe Ser Ser Cys Ile Ala  
325 330 335

Leu Arg Pro Asp Gln Gln Ile Gly Ile Val Ala Leu Ala Asn Met Asn  
340 345 350

Ser Asn Leu Ile Leu Gln Leu Cys Ala Asp Ile Asp Asn Tyr Leu Arg  
355 360 365

Ile Gly Lys Tyr Ala Asp Gly Ala Gly Asp Ala Ile Thr Ala Thr Asp  
370 375 380

Thr Leu Phe Val Tyr Leu Thr Leu Leu Cys Phe Trp Gly Ala Val  
385 390 395 400

Val Val Val Arg Gly Ala Phe Arg Val Tyr Arg Ala Thr Ala His Gly  
405 410 415

Pro Gly Lys Gln Gln Arg Leu Arg Leu Arg Val Arg Asp Tyr Ile Ile  
420 425 430

Ala Leu Ala Val Pro Gly Leu Val Ala Ala Met Leu Tyr Val Ala Pro  
435 440 445

Gly Ile Leu Ser Pro Gly Leu Asp Trp Arg Phe Ile Leu Val Trp Gly  
450 455 460

Pro Ser Ser Val Leu Ala Ile Pro Phe Gly Ile Ile Leu Leu Ala Phe  
465 470 475 480

Val Leu Thr Leu Asn His Gln Ile Lys Arg Ile Leu Leu His Asn Lys  
485 490 495

Glu Trp Asp Asp Glu  
500

<210> 40  
<211> 682  
<212> PRT

<213> Escherichia coli

<400> 40

Met Lys Asn Lys Tyr Ile Ile Ala Pro Gly Ile Ala Val Met Cys Ser  
1 5 10 15

Ala Val Ile Ser Ser Gly Tyr Ala Ser Ser Asp Lys Lys Glu Asp Thr  
20 25 30

Leu Val Val Thr Ala Ser Gly Phe Thr Gln Gln Leu Arg Asn Ala Pro

35

40

45

Ala Ser Val Ser Val Ile Thr Ser Glu Gln Leu Gln Lys Lys Pro Val  
50 55 60

Ser Asp Leu Val Asp Ala Val Lys Asp Val Glu Gly Ile Ser Ile Thr  
65 70 75 80

Gly Gly Asn Glu Lys Pro Asp Ile Ser Ile Arg Gly Leu Ser Gly Asp  
85 90 95

Tyr Thr Leu Ile Leu Val Asp Gly Arg Arg Gln Ser Gly Arg Glu Ser  
100 105 110

Arg Pro Asn Gly Ser Gly Gly Phe Glu Ala Gly Phe Ile Pro Pro Val  
115 120 125

Glu Ala Ile Glu Arg Ile Glu Val Ile Arg Gly Pro Met Ser Ser Leu  
130 135 140

Tyr Gly Ser Asp Ala Ile Gly Gly Val Ile Asn Ile Ile Thr Lys Pro  
145 150 155 160

Val Asn Asn Gln Thr Trp Asp Gly Val Leu Gly Leu Gly Gly Ile Ile  
165 170 175

Gln Glu His Gly Lys Phe Gly Asn Ser Thr Thr Asn Asp Phe Tyr Leu  
180 185 190

Ser Gly Pro Leu Ile Lys Asp Lys Leu Gly Leu Gln Leu Tyr Gly Gly  
195 200 205

Met Asn Tyr Arg Lys Glu Asp Ser Ile Ser Gln Gly Thr Pro Ala Lys  
210 215 220

Asp Asn Lys Asn Ile Thr Ala Thr Leu Gln Phe Thr Pro Thr Glu Ser  
225 230 235 240

Gln Lys Phe Val Phe Glu Tyr Gly Lys Asn Asn Gln Val His Thr Leu  
245 250 255

Thr Pro Gly Glu Ser Leu Asp Ala Trp Thr Met Arg Gly Asn Leu Lys  
260 265 270

Gln Pro Asn Ser Lys Arg Glu Thr His Asn Ser Arg Ser His Trp Val  
275 280 285

Ala Ala Trp Asn Ala Gln Gly Glu Ile Leu His Pro Glu Ile Ala Val  
290 295 300

Tyr Gln Glu Lys Val Ile Arg Glu Val Lys Ser Gly Lys Lys Asp Lys  
305 310 315 320

Tyr Asn His Trp Asp Leu Asn Tyr Glu Ser Arg Lys Pro Glu Ile Thr  
325 330 335

Asn Thr Ile Ile Asp Ala Lys Val Thr Ala Phe Leu Pro Glu Asn Val  
340 345 350

Leu Thr Ile Gly Gly Gln Phe Gln His Ala Glu Leu Arg Asp Asp Ser  
355 360 365

Ala Thr Gly Lys Lys Thr Thr Glu Thr Gln Ser Val Ser Ile Lys Gln  
370 375 380

Lys Ala Val Phe Ile Glu Asn Glu Tyr Ala Ala Thr Asp Ser Leu Ala  
385 390 395 400

Leu Thr Gly Gly Leu Arg Leu Asp Asn His Glu Ile Tyr Gly Ser Tyr  
405 410 415

Trp Asn Pro Arg Leu Tyr Ala Val Tyr Asn Leu Thr Asp Asn Leu Thr  
420 425 430

Leu Lys Gly Gly Ile Ala Lys Ala Phe Arg Ala Pro Ser Ile Arg Glu  
435 440 445

Val Ser Pro Gly Phe Gly Thr Leu Thr Gln Gly Gly Ala Ser Ile Met  
450 455 460

Tyr Gly Asn Arg Asp Leu Lys Pro Glu Thr Ser Val Thr Glu Glu Ile  
465 470 475 480

Gly Ile Ile Tyr Ser Asn Asp Ser Gly Phe Ser Ala Ser Ala Thr Leu  
485 490 495

Phe Asn Thr Asp Phe Lys Asn Lys Leu Thr Ser Tyr Asp Ile Gly Thr  
500 505 510

Lys Asp Pro Val Thr Gly Leu Asn Thr Phe Ile Tyr Asp Asn Val Gly  
515 520 525

Glu Ala Asn Ile Arg Gly Val Glu Leu Ala Thr Gln Ile Pro Val Tyr  
530 535 540

Asp Lys Trp His Val Ser Ala Asn Tyr Thr Phe Thr Asp Ser Arg Arg  
545 550 555 560

Lys Ser Asp Asp Glu Ser Leu Asn Gly Lys Ser Leu Lys Gly Glu Pro  
565 570 575

Leu Glu Arg Thr Pro Arg His Ala Ala Asn Ala Lys Leu Glu Trp Asp  
580 585 590

Tyr Thr Gln Asp Ile Thr Phe Tyr Ser Ser Leu Asn Tyr Thr Gly Lys  
595 600 605

Gln Ile Trp Ala Ala Gln Arg Asn Gly Ala Lys Val Pro Arg Val Arg  
610 615 620

Asn Gly Phe Thr Ser Met Asp Ile Gly Leu Asn Tyr Gln Ile Leu Pro  
625 630 635 640

Asp Thr Leu Ile Asn Phe Ala Val Leu Asn Val Thr Asp Arg Lys Ser  
645 650 655

Glu Asp Ile Asp Thr Ile Asp Gly Asn Trp Gln Val Asp Glu Gly Arg  
660 665 670

Arg Tyr Trp Ala Asn Val Arg Val Ser Phe  
675 680

<210> 41  
<211> 164  
<212> PRT

<213> Escherichia coli

<400> 41

Met Gly Phe Arg Lys Thr Ile Ile Thr Ser Val Gly Leu Ile Phe Ile  
1 5 10 15

Ser Phe Ser Phe Val Ala Lys Cys Ser Gln Leu Lys Asn Leu Asn Asn  
20 25 30

Tyr Ser Val Met Leu Cys Gly Lys Val Ser Asn Asn Ile Leu Asp Asp  
35 40 45

Ile Gly Gly Tyr Lys Glu Arg Asn Ile Leu Met Leu Arg Ala Ile Lys  
50 55 60

Lys Ile Ile Ile Met Thr Ile Val Asn Ile Ile Phe Phe Tyr Ser Phe  
65 70 75 80

Gln Ser Thr Ala Asp Glu Met Val Leu Ile Lys Lys Tyr Gly Phe Gly  
85 90 95

Leu Glu Arg Asp Ile Lys Gly Arg Pro Leu Ile Tyr Pro Ile Glu Asn  
100 105 110

Tyr Asp Glu Cys Lys Lys Lys Cys Asn His Met Asn Tyr Ile Ala Asp  
115 120 125

Val Asn Ala Gln Leu Ala Met Ser Lys Lys Asn Asn Arg Ile Phe Ala  
130 135 140

Asn Ile Thr Phe Thr Asn Asn Ser Ser Thr Thr Tyr Phe Phe Leu Asn  
145 150 155 160

Ile Ile Tyr Leu

<210> 42

<211> 218

<212> PRT

<213> Escherichia coli

<400> 42

Met Asn Gln Ile Lys Asp Asn Lys Val Ile Met Lys Ile Lys Asn Leu  
1 5 10 15

Ile Ser Val Ile Leu Leu Ser Gly Gly Ile Met Gly Thr Gly Leu Tyr

20

25

30

Ser Ser Asp Asn His Gln Lys Ile Arg Ser Arg Phe Asn Ile Gln Glu  
 35 40 45

Ser Tyr Cys Ala Ile Lys Thr Asn Gly Val Leu Gly Phe Ser Asn Arg  
 50 55 60

Lys Asp Val Leu Arg Glu Asn Gly Asp Ser Thr Gly Thr Thr Ser Ser  
 65 70 75 80

Ser Thr Asn Ala Met Met Leu Met Glu Asn Gly Glu Asn Glu Ile Ser  
 85 90 95

Leu Glu Ile Gly Ala Leu Arg Trp Phe Ser Asp Lys Pro Ala Ser Thr  
 100 105 110

Glu Glu Arg Gly His Phe Ser Gln Lys Ala Gly Cys Ser Leu Asp Leu  
 115 120 125

Val Arg Phe Val Lys Gln Glu Glu Thr Ile Leu Ser Ser Ile Lys Val  
 130 135 140

Thr Ile Asn Gln Gln Gly Ile Pro Glu Ala Gln Pro Asp Ser Met His  
 145 150 155 160

Pro Val Ile Arg Lys Glu Ile Leu Ala Glu Gln Ala Glu Pro Gly Phe  
 165 170 175

Ile Asp Pro Asp Tyr Phe Asn Glu Thr Tyr Phe Pro Lys Gly Met Lys  
 180 185 190

Val Tyr Gln Phe Thr Gln Lys Val Ser Val Ala Gly Leu Pro Asp Gly  
 195 200 205

Pro Gly Arg Ser Thr Pro Phe Thr Gly Ala  
 210 215

<210> 43

<211> 2732

<212> PRT

<213> Escherichia coli



<400> 43

Met His Gln Pro Pro Val Arg Phe Thr Tyr Arg Leu Leu Ser Tyr Leu  
1 5 10 15

Val Ser Ala Ile Ile Ala Gly Gln Pro Leu Leu Pro Ala Val Gly Ala  
20 25 30

Val Ile Thr Pro Gln Asn Gly Ala Gly Met Asp Lys Ala Ala Asn Gly  
35 40 45

Val Pro Val Val Asn Ile Ala Thr Pro Asn Gly Ala Gly Ile Ser His  
50 55 60

Asn Arg Phe Thr Asp Tyr Asn Val Gly Lys Glu Gly Leu Ile Leu Asn  
65 70 75 80

Asn Ala Thr Gly Lys Leu Asn Pro Thr Gln Leu Gly Gly Leu Ile Gln  
85 90 95

Asn Asn Pro Asn Leu Lys Ala Gly Gly Glu Ala Lys Gly Ile Ile Asn  
100 105 110

Glu Val Thr Gly Gly Lys Arg Ser Leu Leu Gln Gly Tyr Thr Glu Val  
115 120 125

Ala Gly Lys Ala Ala Asn Val Met Val Ala Asn Pro Tyr Gly Ile Thr  
130 135 140

Cys Asp Gly Cys Gly Phe Ile Asn Thr Pro His Ala Thr Leu Thr Thr  
145 150 155 160

Gly Lys Pro Val Met Asn Ala Asp Gly Ser Leu Gln Ala Leu Glu Val  
165 170 175

Thr Glu Gly Ser Ile Thr Ile Asn Gly Ala Gly Leu Asp Gly Thr Arg  
180 185 190

Ser Asp Ala Val Ser Ile Ile Ala Arg Ala Thr Glu Val Asn Ala Ala  
195 200 205

Leu His Ala Lys Asp Leu Thr Val Thr Ala Gly Ala Asn Arg Val Thr  
210 215 220

Ala Asp Gly Arg Val Arg Ala Leu Lys Gly Glu Gly Asp Val Pro Lys  
225 230 235 240

Val Ala Val Asp Thr Gly Ala Leu Gly Gly Met Tyr Ala Arg Arg Ile  
245 250 255

His Leu Thr Ser Thr Glu Ser Gly Val Gly Val Asn Leu Gly Asn Leu  
260 265 270

Tyr Ala Arg Asp Gly Asp Ile Thr Leu Asp Ala Ser Gly Arg Leu Thr  
275 280 285

Val Asn Asn Ser Leu Ala Thr Gly Ala Val Thr Ala Lys Gly Gln Gly  
290 295 300

Val Thr Leu Thr Gly Asp His Lys Ala Gly Gly Asn Leu Ser Val Ser  
305 310 315 320

Ser Arg Arg Asp Ile Val Leu Ser Asn Gly Thr Leu Asn Ser Asp Lys  
325 330 335

Asp Leu Ser Leu Thr Ala Gly Gly Arg Ile Thr Gln Gln Asn Glu Lys  
340 345 350

Leu Thr Ala Gly Arg Asp Val Thr Leu Ala Ala Lys Asn Ile Thr Gln  
355 360 365

Asp Thr Ala Ser Gln Ile Asn Ala Ala Arg Asp Ile Val Thr Val Ala  
370 375 380

Ser Asp Thr Leu Thr Thr Gln Gly Gln Ile Thr Ala Gly Gln Asn Leu  
385 390 395 400

Thr Ala Ser Ala Thr Thr Leu Thr Gln Asp Gly Ile Leu Leu Ala Lys  
405 410 415

Ser His Ala Gly Leu Asn Ala Gly Thr Leu Asn Asn Ser Gly Ala Val  
420 425 430

Gln Gly Ala Thr Leu Thr Leu Gly Ser Thr Thr Leu Ser Asn Ser Gly  
435 440 445

Ser Leu Leu Ser Gly Gly Pro Leu Thr Met Asn Thr Arg Asp Phe Thr  
450 455 460

Gln Ser Gly Arg Thr Gly Ala Lys Gly Lys Val Asp Ile Met Ala Ser  
465 470 475 480

Gly Lys Leu Thr Ser Thr Gly Leu Leu Val Thr Met His Leu Val Leu  
485 490 495

Lys Ala Gln Asp Val Thr Gln Asn Gly Val Leu Ser Gly Gly Lys Gly  
500 505 510

Leu Thr Val Ser Ala Thr Ser Ser Gly Lys Lys Ser Val Thr His Ser  
515 520 525

Asp Ala Ala Met Thr Leu Asn Val Thr Thr Val Ala Leu Asp Gly Glu  
530 535 540

Thr Ser Ala Gly Asp Thr Leu Arg Val Gln Ala Asp Lys Leu Ser Thr  
545 550 555 560

Ala Ala Gly Ala Gln Leu Gln Ser Gly Lys Asn Leu Ser Ile Asn Ala  
565 570 575

Arg Asp Ala Arg Leu Ala Gly Thr Gln Ala Ala Gln Gln Thr Met Val  
580 585 590

Val Asn Ala Ser Glu Lys Leu Thr His Ser Gly Lys Ser Ser Ala Pro  
595 600 605

Ser Leu Ser Leu Ser Ala Pro Glu Leu Thr Ser Ser Gly Val Leu Val  
610 615 620

Gly Ser Ala Leu Asn Thr Gln Ser Gln Thr Leu Thr Asn Ser Gly Leu  
625 630 635 640

Leu Gln Gly Glu Ala Ser Leu Thr Val Asn Thr Gln Arg Leu Asp Asn  
645 650 655

Gln Gln Asn Gly Thr Leu Tyr Ser Ala Ala Asp Leu Thr Leu Asp Ile  
660 665 670

Pro Asp Ile Arg Asn Ser Gly Leu Ile Thr Gly Asp Asn Gly Leu Met

675

680

685

Leu Asn Ala Val Ser Leu Ser Asn Pro Gly Lys Ile Ile Ala Asp Thr  
690 695 700

Leu Ser Val Arg Ala Thr Thr Leu Asp Gly Asp Gly Leu Leu Gln Gly  
705 710 715 720

Ala Gly Ala Leu Ala Leu Ala Gly Asp Thr Leu Ser Gln Gly Ser His  
725 730 735

Gly Arg Trp Leu Thr Ala Asp Asp Leu Ser Leu Arg Gly Lys Thr Leu  
740 745 750

Asn Thr Ala Gly Thr Thr Gln Gly Gln Asn Ile Thr Val Gln Ala Asp  
755 760 765

Arg Trp Ala Asn Ser Gly Ser Val Leu Ala Thr Gly Asn Leu Thr Ala  
770 775 780

Ser Ala Thr Gly Gln Leu Thr Ser Thr Gly Asp Ile Met Ser Gln Gly  
785 790 795 800

Asp Thr Thr Leu Lys Ala Ala Thr Thr Asp Asn Arg Gly Ser Leu Leu  
805 810 815

Ser Ala Gly Thr Leu Ser Leu Asp Gly Asn Ser Leu Asp Asn Arg Gly  
820 825 830

Thr Val Gln Gly Asn His Val Thr Ile Arg Gln Asn Ser Val Thr Asn  
835 840 845

Ser Gly Thr Leu Thr Gly Ile Ala Ala Leu Thr Leu Ala Ala Arg Met  
850 855 860

Ala Ser Pro Gln Pro Ala Leu Met Asn Asn Gly Gly Ser Leu Leu Thr  
865 870 875 880

Ser Gly Asp Leu Thr Ile Thr Ala Gly Ser Ile Thr Ser Ser Gly His  
885 890 895

Trp Gln Gly Lys Arg Val Leu Ile Thr Ala Asp Ser Leu Ala Asn Ser  
900 905 910

Gly Ala Ile Gln Ala Ala Asp Ser Leu Thr Ala Arg Leu Thr Gly Glu  
915 920 925

Leu Val Ser Thr Ala Gly Ser Lys Val Thr Ser Asn Gly Glu Met Ala  
930 935 940

Leu Ser Ala Leu Asn Leu Ser Asn Ser Gly Gln Trp Ile Ala Lys Asn  
945 950 955 960

Leu Thr Leu Lys Ala Asn Ser Leu Thr Ser Ala Gly Asp Ile Thr Gly  
965 970 975

Val Asp Thr Leu Thr Leu Thr Val Asn Gln Thr Leu Asn Asn Gln Ala  
980 985 990

Asn Gly Lys Leu Leu Ser Ala Gly Val Leu Thr Leu Lys Ala Asp Ser  
995 1000 1005

Val Thr Asn Asp Gly Gln Leu Gln Gly Asn Val Thr Thr Ile Thr  
1010 1015 1020

Ala Gly Gln Leu Thr Asn Gly Gly His Leu Gln Gly Glu Thr Leu  
1025 1030 1035

Thr Leu Thr Ala Ser Gly Gly Val Asn Asn Arg Ser Gly Gly Val  
1040 1045 1050

Leu Met Ser Arg Asn Ala Leu Asn Val Ser Thr Ala Thr Leu Ser  
1055 1060 1065

Asn Gln Ser Thr Ile Gln Gly Gly Gly Gly Val Ser Leu Asn Ala  
1070 1075 1080

Thr Asp Arg Leu Gln Asn Asp Gly Lys Ile Leu Ser Gly Ser Asn  
1085 1090 1095

Leu Thr Leu Thr Ala Gln Val Leu Ala Asn Thr Gly Ser Gly Leu  
1100 1105 1110

Val Gln Ala Ala Thr Leu Leu Leu Asp Val Val Asn Thr Val Asn  
1115 1120 1125

Gly Gly Arg Val Leu Ala Thr Gly Ser Asp Val Lys Gly Thr Thr  
1130 1135 1140

Leu Asn Asn Thr Gly Thr Leu Gln Gly Ala Thr Leu Val Asn Tyr  
1145 1150 1155

His Thr Phe Ser Ser Gly Thr Leu Leu Gly Thr Ser Gly Leu Gly  
1160 1165 1170

Val Lys Gly Ser Ser Leu Leu Gln Asn Gly Thr Gly Arg Leu Tyr  
1175 1180 1185

Ser Ala Gly Asn Leu Leu Leu Asp Ala Gln Asp Phe Ser Gly Gln  
1190 1195 1200

Gly Gln Val Val Ala Thr Gly Asp Val Thr Leu Lys Leu Ile Ala  
1205 1210 1215

Ala Leu Thr Asn His Gly Thr Leu Ala Ala Gly Lys Thr Leu Ser  
1220 1225 1230

Val Thr Ser Gln Asn Ala Ile Thr Asn Gly Gly Val Met Gln Gly  
1235 1240 1245

Asp Ala Met Val Leu Gly Ala Gly Glu Ala Phe Thr Asn Asn Gly  
1250 1255 1260

Leu Thr Ala Gly Lys Gly Asn Ser Val Phe Ser Ala Gln Arg Leu  
1265 1270 1275

Phe Leu Asn Ala Pro Gly Ser Leu Gln Gly Gly Gly Asp Val Ser  
1280 1285 1290

Leu Asn Ser Arg Ser Asp Ile Thr Ile Ser Gly Phe Thr Gly Thr  
1295 1300 1305

Ala Gly Ser Leu Thr Met Asn Val Ala Gly Thr Leu Leu Asn Ser  
1310 1315 1320

Ala Leu Ile Tyr Ala Gly Asn Asn Leu Lys Leu Phe Thr Asp Arg  
1325 1330 1335

Leu	His	Asn	Gln	His	Gly	Asp	Ile	Leu	Ala	Gly	Asn	Ser	Leu	Trp
1340						1345					1350			
Val	Gln	Lys	Asp	Ala	Ser	Gly	Gly	Ala	Asn	Thr	Glu	Ile	Ile	Asn
1355						1360					1365			
Asn	Ser	Gly	Asn	Ile	Glu	Thr	His	Gln	Gly	Asp	Ile	Val	Val	Arg
1370						1375					1380			
Thr	Gly	His	Leu	Leu	Asn	Gln	Arg	Glu	Gly	Phe	Ser	Ala	Thr	Thr
1385						1390					1395			
Thr	Thr	Arg	Thr	Asn	Pro	Ser	Ser	Ile	Gln	Gly	Met	Gly	Asn	Ala
1400						1405					1410			
Leu	Val	Asp	Ile	Pro	Leu	Ser	Leu	Leu	Pro	Asp	Gly	Ser	Tyr	Gly
1415						1420					1425			
Tyr	Phe	Thr	Arg	Glu	Val	Glu	Asn	Gln	His	Gly	Thr	Pro	Cys	Asn
1430						1435					1440			
Gly	His	Gly	Ala	Cys	Asn	Ile	Thr	Met	Asp	Thr	Leu	Tyr	Tyr	Tyr
1445						1450					1455			
Ala	Pro	Phe	Ala	Asp	Ser	Ala	Thr	Gln	Arg	Phe	Leu	Ser	Ser	Gln
1460						1465					1470			
Asn	Ile	Thr	Thr	Val	Thr	Gly	Ala	Asp	Asn	Pro	Ala	Gly	Arg	Ile
1475						1480					1485			
Ala	Ser	Gly	Arg	Asn	Leu	Ser	Ala	Glu	Ala	Glu	Arg	Leu	Glu	Asn
1490						1495					1500			
Arg	Ala	Ser	Phe	Ile	Leu	Ala	Asn	Gly	Asp	Ile	Ala	Leu	Ser	Gly
1505						1510					1515			
Arg	Glu	Leu	Ser	Asn	Gln	Ser	Trp	Gln	Thr	Gly	Thr	Glu	Asn	Glu
1520						1525					1530			
Tyr	Leu	Val	Tyr	Arg	Tyr	Asp	Pro	Lys	Thr	Phe	Tyr	Gly	Ser	Tyr
1535						1540					1545			
Ala	Thr	Gly	Ser	Leu	Asp	Lys	Leu	Pro	Leu	Leu	Ser	Pro	Glu	Phe

1550						1555						1560			
Glu	Asn	Asn	Thr	Ile	Arg	Phe	Ser	Leu	Asp	Gly	Arg	Glu	Lys	Asp	
1565						1570					1575				
Tyr	Thr	Pro	Gly	Lys	Thr	Tyr	Tyr	Ser	Val	Ile	Gln	Ala	Gly	Gly	
1580						1585					1590				
Asp	Val	Lys	Thr	Arg	Phe	Thr	Ser	Ser	Ile	Asn	Asn	Gly	Thr	Thr	
1595						1600					1605				
Thr	Ala	His	Ala	Gly	Ser	Val	Ser	Pro	Val	Val	Ser	Ala	Pro	Val	
1610						1615					1620				
Leu	Asn	Thr	Leu	Ser	Gln	Gln	Thr	Gly	Gly	Asp	Ser	Leu	Thr	Gln	
1625						1630					1635				
Thr	Ala	Leu	Gln	Gln	Tyr	Glu	Pro	Val	Val	Val	Gly	Ser	Pro	Gln	
1640						1645					1650				
Trp	His	Asp	Glu	Leu	Ala	Gly	Ala	Leu	Lys	Asn	Ile	Ala	Gly	Gly	
1655						1660					1665				
Ser	Pro	Leu	Thr	Gly	Gln	Thr	Gly	Ile	Ser	Asp	Asp	Trp	Pro	Leu	
1670						1675					1680				
Pro	Ser	Gly	Asn	Asn	Gly	Tyr	Leu	Val	Pro	Ser	Thr	Asp	Pro	Asp	
1685						1690					1695				
Ser	Pro	Tyr	Leu	Ile	Thr	Val	Asn	Pro	Lys	Leu	Asp	Gly	Leu	Gly	
1700						1705					1710				
Gln	Val	Asp	Ser	His	Leu	Phe	Ala	Gly	Leu	Tyr	Glu	Leu	Leu	Gly	
1715						1720					1725				
Ala	Lys	Pro	Gly	Gln	Ala	Pro	Arg	Glu	Thr	Ala	Pro	Ser	Tyr	Thr	
1730						1735					1740				
Asp	Glu	Lys	Gln	Phe	Leu	Gly	Ser	Ser	Tyr	Phe	Leu	Asp	Arg	Leu	
1745						1750					1755				
Gly	Leu	Lys	Pro	Glu	Lys	Asp	Tyr	Arg	Phe	Leu	Gly	Asp	Ala	Val	
1760						1765					1770				



Phe Asp Thr Arg Tyr Val Ser Asn Ala Val Leu Ser Arg Thr Gly  
1775 1780 1785

Ser Arg Tyr Leu Asn Gly Leu Gly Ser Asp Thr Glu Gln Met Arg  
1790 1795 1800

Tyr Leu Met Asp Asn Ala Ala Arg Gln Gln Lys Gly Leu Gly Leu  
1805 1810 1815

Glu Phe Gly Val Ala Leu Thr Ala Glu Gln Ile Ala Gln Leu Asp  
1820 1825 1830

Gly Ser Ile Leu Trp Trp Glu Ser Val Thr Ile Asn Gly Gln Thr  
1835 1840 1845

Val Met Val Pro Lys Leu Tyr Leu Ser Pro Glu Asp Ile Thr Leu  
1850 1855 1860

His Asn Gly Ser Val Ile Ser Gly Asn Asn Val Gln Leu Ala Gly  
1865 1870 1875

Gly Asn Ile Thr Asn Ser Gly Gly Ser Ile Asn Ala Gln Asn Asp  
1880 1885 1890

Leu Ser Leu Asp Ser Ser Gly Tyr Ile Asp Asn Leu Asn Ala Gly  
1895 1900 1905

Leu Ile Ser Ala Gly Gly Ser Leu Asp Leu Ser Ala Ile Gly Asp  
1910 1915 1920

Ile Ser Asn Ile Ser Ser Val Ile Ser Gly Lys Thr Val Gln Leu  
1925 1930 1935

Glu Ser Val Ser Gly Asn Ile Ser Asn Ile Thr Arg Arg Gln Gln  
1940 1945 1950

Trp Asn Ala Gly Ser Asp Ser Gln Tyr Gly Gly Val His Leu Ser  
1955 1960 1965

Gly Thr Asp Thr Gly Pro Val Ala Thr Ile Lys Gly Thr Asp Ser  
1970 1975 1980

Leu Ser Leu Asp Ala Gly Lys Asn Ile Asp Ile Thr Gly Ala Thr  
1985 1990 1995

Val Ser Ser Gly Gly Asp Leu Gly Met Ser Ala Gly Asn Asp Ile  
2000 2005 2010

Asn Ile Ala Ala Asn Leu Ile Ser Gly Ser Lys Ser Gln Ser Gly  
2015 2020 2025

Phe Trp His Thr Asp Asp Asn Ser Ser Ser Ser Thr Thr Ser Gln  
2030 2035 2040

Gly Ser Ser Ile Ser Ala Gly Gly Asn Leu Ala Met Ala Ala Gly  
2045 2050 2055

His Asn Leu Asp Val Thr Ala Ser Ser Val Ser Ala Gly His Ser  
2060 2065 2070

Ala Leu Leu Ser Cys Arg Ser Arg Pro Ser Leu Glu Cys Ser Gln  
2075 2080 2085

Gly Lys Ala Lys Thr Ser Arg Asn Gly Arg Ser Glu Ser His Glu  
2090 2095 2100

Ser His Ala Ala Val Ser Thr Val Thr Ala Gly Asp Asn Phe Leu  
2105 2110 2115

Leu Val Ala Gly Arg Asp Ile Ala Ser Gln Ala Ala Gly Met Ala  
2120 2125 2130

Ala Glu Asn Asn Val Val Ile Arg Gly Gly Arg Asp Val Asn Leu  
2135 2140 2145

Val Ala Glu Ser Ala Gly Ala Gly Asp Ser Tyr Thr Ser Lys Lys  
2150 2155 2160

Lys Lys Glu Ile Asn Glu Thr Val Arg Gln Gln Gly Thr Glu Ile  
2165 2170 2175

Ala Ser Gly Gly Asp Thr Thr Val Asn Ala Gly Arg Asp Ile Thr  
2180 2185 2190

Ala Val Ala Ser Ser Val Thr Ala Thr Gly Asn Ile Ser Val Asn  
2195 2200 2205

Ala Gly Arg Asp Val Ala Leu Thr Thr Ala Thr Glu Ser Asp Tyr  
2210 2215 2220

His Tyr Leu Glu Thr Lys Lys Lys Ser Gly Gly Phe Leu Ser Lys  
2225 2230 2235

Lys Thr Thr Arg Thr Ile Ser Glu Asp Ser Ala Thr Arg Glu Ala  
2240 2245 2250

Gly Ser Leu Leu Ser Gly Asn Arg Val Thr Val Asn Ala Gly Asp  
2255 2260 2265

Asn Leu Thr Val Glu Gly Ser Asp Val Val Ala Asp Arg Asp Val  
2270 2275 2280

Ser Leu Ala Ala Gly Asn His Val Asp Val Leu Ala Ala Thr Ser  
2285 2290 2295

Thr Asp Thr Ser Trp Arg Phe Lys Glu Thr Lys Lys Ser Gly Leu  
2300 2305 2310

Met Gly Thr Gly Gly Ile Gly Phe Thr Ile Gly Ser Ser Lys Thr  
2315 2320 2325

Thr His Asp Arg Arg Glu Ala Gly Thr Thr Gln Ser Gln Ser Ala  
2330 2335 2340

Ser Thr Ile Gly Ser Thr Ala Gly Asn Val Ser Ile Thr Ala Gly  
2345 2350 2355

Lys Gln Ala His Ile Ser Gly Ser Asp Val Ile Ala Asn Arg Asp  
2360 2365 2370

Ile Ser Ile Thr Gly Asp Ser Val Val Val Asp Pro Gly His Asp  
2375 2380 2385

Arg Arg Thr Val Asp Glu Lys Phe Glu Gln Lys Lys Ser Gly Leu  
2390 2395 2400

Thr Val Ala Leu Ser Gly Thr Val Gly Ser Ala Ile Asn Asn Ala

	2405					2410					2415				
Val	Thr	Ser	Ala	Gln	Glu	Thr	Lys	Glu	Ser	Ser	Asp	Ser	Arg	Leu	
	2420					2425					2430				
Lys	Ala	Leu	Gln	Ala	Thr	Lys	Thr	Ala	Leu	Ser	Gly	Val	Gln	Ala	
	2435					2440					2445				
Gly	Gln	Ala	Ala	Thr	Met	Ala	Ser	Ala	Thr	Gly	Asp	Pro	Asn	Ala	
	2450					2455					2460				
Gly	Val	Ser	Leu	Ser	Leu	Thr	Thr	Gln	Lys	Ser	Lys	Ser	Gln	Gln	
	2465					2470					2475				
His	Ser	Glu	Ser	Asp	Thr	Val	Ser	Gly	Ser	Thr	Leu	Asn	Ala	Gly	
	2480					2485					2490				
Asn	Asn	Leu	Ser	Val	Val	Ala	Thr	Gly	Lys	Asn	Arg	Gly	Asp	Asn	
	2495					2500					2505				
Arg	Gly	Asp	Ile	Val	Ile	Ala	Gly	Ser	Gln	Leu	Lys	Ala	Gly	Gly	
	2510					2515					2520				
Asn	Thr	Ser	Leu	Asp	Ala	Ala	Asn	Asp	Ile	Leu	Leu	Ser	Gly	Ala	
	2525					2530					2535				
Ala	Asn	Thr	Gln	Lys	Thr	Thr	Gly	Arg	Asn	Ser	Ser	Ser	Gly	Gly	
	2540					2545					2550				
Gly	Val	Gly	Val	Ser	Ile	Gly	Ala	Gly	Lys	Gly	Ala	Gly	Ile	Ser	
	2555					2560					2565				
Ala	Phe	Ala	Ser	Val	Asn	Ala	Ala	Lys	Gly	Arg	Glu	Lys	Gly	Asn	
	2570					2575					2580				
Gly	Thr	Thr	Thr	Asp	Lys	Thr	Val	Thr	Ile	Asn	Ser	Gly	Arg	Asp	
	2585					2590					2595				
Thr	Val	Leu	Asn	Gly	Ala	Gln	Val	Asn	Gly	Asn	Arg	Ile	Ile	Ala	
	2600					2605					2610				
Asp	Val	Gly	His	Asp	Leu	Leu	Ile	Ser	Ser	Gln	Gln	Asp	Thr	Ser	
	2615					2620					2625				

Lys Tyr Asp Ser Lys Gln Thr Ser Val Ala Ala Gly Gly Ser Phe  
2630 2635 2640

Thr Phe Gly Ser Met Thr Gly Ser Gly Tyr Ile Ala Ala Ser Arg  
2645 2650 2655

Asp Lys Met Lys Ser Arg Phe Asp Ser Val Ala Glu Gln Thr Gly  
2660 2665 2670

Met Phe Ala Arg Val Met Val Ala Ser Thr Ser Gln Trp Val Asn  
2675 2680 2685

Ile Pro Asn Trp Met Val Arg Ser Leu Pro His Cys His Thr Gly  
2690 2695 2700

Glu Lys Pro Pro Gly Tyr Arg Thr Leu Gly Leu Val Thr Leu Gln  
2705 2710 2715

Arg Ser Gly Ile Ile Lys Ser Ser His Arg Trp Asn Gln Ser  
2720 2725 2730

<210> 44

<211> 321

<212> PRT

<213> Escherichia coli

<400> 44

Met Met Leu Lys Lys Thr Ile Phe Ile Leu Thr Leu Phe Ser Gly Asn  
1 5 10 15

Val Ile Ala Ala Thr Val Glu Leu Gly Phe Glu Asn Glu Gln Tyr Asn  
20 25 30

Tyr Ala Tyr Arg Ser Ala Asp Val Phe Met Pro Tyr Ile Lys Ser Asn  
35 40 45

Phe Asn Pro Val Thr Asp Ser Ala Leu Asn Val Ser Leu Thr Tyr Met  
50 55 60

Tyr Gln Asp Gln Tyr Gly Lys Lys His Lys Lys Thr Ser Glu Asp Arg  
65 70 75 80

Phe Lys Thr Asn Arg Asp Arg Ile Glu Leu Tyr Leu Lys Gly Tyr Thr  
85 90 95

Leu Asn Arg Gly Ala Tyr Ser Phe Ser Pro Ser Ala Gly Phe Arg Tyr  
100 105 110

Glu Ser Trp Asp Val Asn Tyr Asp Asn Pro Lys Lys Gln Asp Lys Trp  
115 120 125

Lys Leu Glu Leu Arg Phe Tyr Pro Asn Met Thr Tyr Lys Leu Asn Asp  
130 135 140

Gln Leu Ser Leu Tyr Met Asn Gly Phe Val Ala Pro Val Phe Phe Lys  
145 150 155 160

Thr Gln Gln Glu Ser Arg Lys Asp Asn Asn Tyr Val Lys Gly Lys Leu  
165 170 175

Gly Ala Lys Arg Tyr Asn Asn Asp Tyr Tyr Gln Glu Leu Gln Ile Leu  
180 185 190

Gly Val Arg Tyr Lys Phe Asn Asn Asp Asn Thr Leu Trp Ala Ser Val  
195 200 205

Tyr Asn Glu Arg Lys Tyr Asn Gln His Ser Ser Lys Tyr Asp Arg Trp  
210 215 220

Gln Leu Arg Gly Gly Tyr Asp Phe Lys Val Thr Glu Glu Phe Val Leu  
225 230 235 240

Ser Pro Phe Ile Arg Tyr Asp Leu Ser Tyr Arg Glu Lys Asn Leu Glu  
245 250 255

Ser Thr Ser Asn Asn Gly Leu Ser Lys Asn Asn Lys Glu Ile Arg Thr  
260 265 270

Gly Ala Ser Phe Ser Tyr Lys Ile Ile Pro Ser Val Lys Leu Val Gly  
275 280 285

Glu Ile Tyr Arg Gln Thr Thr Asn Ile Glu Asn Tyr Tyr Gly Glu His  
290 295 300

Ser Glu Asp Lys Asn Arg Met Phe Tyr Lys Leu Gly Ile Asn Lys Thr  
305 310 315 320

Phe

<210> 45  
<211> 587  
<212> PRT

<213> Escherichia coli

<400> 45

Met Gln His Arg Gln Lys Asn Ile Leu Thr Lys Thr Ser Leu Leu Ser  
1 5 10 15

Arg Ala Leu Ser Val Pro Cys Cys Asp Met Phe Arg Arg Gly Ser Pro  
20 25 30

Trp Ile Cys Tyr Leu Ser Leu Ser Val Phe Ser Gly Cys Phe Ile Pro  
35 40 45

Ala Phe Ser Ser Pro Ala Ala Met Leu Ser Pro Gly Asp Arg Ser Ala  
50 55 60

Ile Gln Gln Gln Gln Gln Gln Leu Leu Asp Glu Asn Gln Arg Gln Arg  
65 70 75 80

Asp Ala Leu Glu Arg Pro Leu Thr Ile Thr Pro Ser Pro Glu Thr Ser  
85 90 95

Ala Gly Thr Glu Gly Pro Cys Phe Thr Val Ser Ser Ile Val Val Ser  
100 105 110

Gly Ala Thr Arg Leu Thr Ser Ala Glu Thr Asp Arg Leu Val Pro Trp  
115 120 125

Val Asn Gln Cys Leu Asn Ile Thr Gly Leu Thr Ala Val Thr Asp Ala  
130 135 140

Val Thr Asp Gly Tyr Ile Arg Arg Gly Tyr Ile Thr Ser Arg Ala Phe  
145 150 155 160

Leu Thr Glu Gln Asp Leu Ser Gly Gly Val Leu His Ile Thr Val Met

165

170

175

Glu Gly Arg Leu Gln Gln Ile Arg Ala Glu Gly Ala Asp Leu Pro Ala  
 180 185 190

Arg Thr Leu Lys Met Val Phe Pro Gly Met Glu Gly Lys Val Leu Asn  
 195 200 205

Leu Arg Asp Ile Glu Gln Gly Met Glu Gln Ile Asn Arg Leu Arg Thr  
 210 215 220

Glu Pro Val Gln Ile Glu Ile Ser Pro Gly Asp Arg Glu Gly Trp Ser  
 225 230 235 240

Val Val Thr Leu Thr Ala Leu Pro Glu Trp Pro Val Thr Gly Ser Val  
 245 250 255

Gly Ile Asp Asn Ser Gly Gln Lys Ser Thr Gly Thr Gly Gln Leu Asn  
 260 265 270

Gly Val Leu Ser Phe Asn Asn Pro Leu Gly Leu Ala Asp Asn Trp Phe  
 275 280 285

Val Ser Gly Gly Arg Ser Ser Asp Phe Ser Val Ser His Asp Ala Arg  
 290 295 300

Asn Phe Ala Ala Gly Val Ser Leu Pro Tyr Gly Tyr Thr Leu Val Asp  
 305 310 315 320

Tyr Thr Tyr Ser Trp Ser Asp Tyr Leu Ser Thr Ile Asp Asn Arg Gly  
 325 330 335

Trp Arg Trp Arg Ser Thr Gly Asp Leu Gln Thr His Arg Leu Gly Leu  
 340 345 350

Ser His Val Leu Phe Arg Asn Gly Asp Met Lys Thr Ala Leu Thr Gly  
 355 360 365

Gly Leu Gln His Arg Ile Ile His Asn Tyr Leu Asp Asp Val Leu Leu  
 370 375 380

Gln Gly Ser Ser Arg Lys Leu Thr Ser Phe Ser Val Gly Leu Asn His  
 385 390 395 400



Thr His Lys Phe Leu Gly Gly Val Gly Thr Leu Asn Pro Val Phe Thr  
405 410 415

Arg Gly Met Pro Trp Phe Gly Ala Glu Ser Asp His Gly Lys Arg Gly  
420 425 430

Asp Leu Pro Val Asn Gln Phe Arg Lys Trp Ser Val Ser Ala Ser Phe  
435 440 445

Gln Arg Pro Val Thr Asp Arg Val Trp Trp Leu Thr Ser Ala Tyr Ala  
450 455 460

Gln Trp Ser Pro Asp Arg Leu His Gly Val Glu Gln Leu Ser Leu Gly  
465 470 475 480

Gly Glu Ser Ser Val Arg Gly Phe Lys Asp Gln Tyr Ile Ser Gly Asn  
485 490 495

Asn Gly Gly Tyr Leu Arg Asn Glu Leu Ser Trp Ser Leu Phe Ser Leu  
500 505 510

Pro Tyr Val Gly Thr Val Arg Ala Val Ala Ala Leu Asp Gly Gly Trp  
515 520 525

Leu His Ser Asp Ser Asp Asp Pro Tyr Ser Ser Gly Thr Leu Trp Gly  
530 535 540

Ala Ala Ala Gly Leu Ser Thr Thr Ser Gly His Val Ser Gly Ser Phe  
545 550 555 560

Thr Ala Gly Leu Pro Leu Val Tyr Pro Asp Trp Leu Ala Pro Asp His  
565 570 575

Leu Thr Val Tyr Trp Arg Val Ala Val Ala Phe  
580 585

<210> 46

<211> 744

<212> PRT

<213> Escherichia coli

<400> 46

Met Asn Lys His Thr Leu Leu Leu Thr Val Leu Phe Leu Asn Leu Ile  
1 5 10 15

Cys Thr Pro Val Phe Ala Gln Asn Trp Gln Val Ala Thr Phe Gly Gln  
20 25 30

Ser Thr Asp Leu Asn Phe Ser Ser Leu Ile Asp Ser Ala Lys Ile Gly  
35 40 45

Arg Asn Asn Ala Trp Leu Ala Gly Asn Asn Asn Phe Leu Glu Ala Gly  
50 55 60

Lys Phe Tyr Thr Leu Pro Thr Asp Phe Phe Ile Glu Ser Arg Gly Gly  
65 70 75 80

Lys Ile Ala Asn Ser His Asp Gly Met Thr Val Phe Tyr Thr Ile Val  
85 90 95

Pro Val Thr Gln Thr Phe Arg Leu Glu Ala Asp Leu Thr Leu Glu Gln  
100 105 110

Ile Gly Pro Glu Val Asn Gly Lys Ser Pro Ala Gly Gln Glu Gly Ala  
115 120 125

Gly Leu Phe Val Arg Asp Ile Ile Gly Pro Gln Arg Gln Glu Pro Gln  
130 135 140

Ser Ala Gly Thr Glu Glu Tyr Pro Gln Ala Ser Asn Ile Leu Met Asn  
145 150 155 160

Ala Phe Ile Thr Gln Asn Lys Lys Asn Asp Asn Leu Val Gln Ile Thr  
165 170 175

Ser Ile Val Arg Glu Gly Val Ile Lys Thr Trp Gly Asn Glu Gly Ile  
180 185 190

Thr Ile Lys Lys Gln Pro Ile Ile Glu Asn Ile Asn Phe Thr Gln Lys  
195 200 205

Arg Asn Ile His Met Thr Ile Glu Arg Leu Pro Glu Lys Phe Ile Leu  
210 215 220

Thr Ala Phe Asp Thr Asp Arg Lys Glu Asn Gln Ser Trp Gln Phe Ser  
225 230 235 240

Asp Tyr Ser Gly Phe Met Asn Gln Leu Asp Asn Asn Ser Leu Ala Ile  
245 250 255

Gly Phe Phe Ala Ala Arg Asn Ala Lys Leu Arg Val Lys Asn Ala Ser  
260 265 270

Phe Lys Pro Gly Lys Pro Leu Val Asp Tyr Lys Gln Leu Thr Ser Arg  
275 280 285

Gln Phe Ser Arg Val Arg His Lys Ala Pro Glu Leu Phe Leu Ala Ser  
290 295 300

Pro Gln Ser Val Val Arg Asn Ser Thr Thr Leu Gln Phe Leu Ala Asn  
305 310 315 320

Gln Ala Gly Ile Val Ser Ile Asp Asn Asp Lys Gln Thr Lys Gln Val  
325 330 335

Gln Ala Gly Glu Leu Val Gln Phe Pro Val Thr Leu Gln Lys Lys His  
340 345 350

Asn Asp Phe Thr Val Asn Phe Asn Val Asp Gly Asn Ile Ser Lys Lys  
355 360 365

Ala Ile Arg Ile Glu Gln Val Lys Ser Asn Leu Thr Asp Pro Tyr Glu  
370 375 380

Ile Tyr Val Cys Ser Asp Cys Arg Gln Gly Ala Arg Gly Ser Lys Asn  
385 390 395 400

Asp Pro Val Asp Leu Gln Thr Ala Val Lys Phe Val Ala Pro Gly Gly  
405 410 415

Asn Ile Tyr Leu Asn Asp Gly Gln Tyr His Gly Ile Thr Leu Asp Arg  
420 425 430

Glu Leu Ser Gly Ile Pro Gly Lys Tyr Lys Thr Ile Ser Ala Ile Asn  
435 440 445

Pro His Lys Ala Ile Phe Ile Asn Lys Thr Phe Asn Leu Asp Ala Ser

450

455

460

Tyr Trp His Leu Lys Ser Val Val Phe Asp Gly Asn Val Asp Asn Gly  
465 470 475 480

Asn Asn Lys Pro Ala Tyr Leu Arg Ile Ala Gly Ser Tyr Asn Ile Ile  
485 490 495

Glu His Val Ile Ala Arg Asn Asn Asp Asp Thr Gly Ile Ser Ile Ser  
500 505 510

Ala Lys Asp Lys Asn Arg Phe Phe Trp Pro Ala His Asn Leu Val Leu  
515 520 525

Asn Ser Asp Ser Tyr Asn Asn Leu Asp Leu Ser Gly Ile Asn Ala Asp  
530 535 540

Gly Phe Ala Ala Lys Leu Gly Val Gly Pro Gly Asn Ile Phe Arg Gly  
545 550 555 560

Cys Ile Ala His Asn Asn Ala Asp Asp Gly Trp Asp Leu Phe Asn Lys  
565 570 575

Ile Glu Asp Gly Pro Asn Ala Ser Val Thr Ile Glu Asn Ser Val Ala  
580 585 590

Tyr Glu Asn Gly Leu Pro Tyr Asn Lys Ala Asp Ile Leu Lys Gly Ser  
595 600 605

Ile Gly Asn Gly Gly Glu Gly Gln Pro Ser Lys Ser Gln Val Ile Asn  
610 615 620

Ser Ile Ala Ile Asn Asn Asn Met Asp Gly Phe Thr Asp Asn Phe Asn  
625 630 635 640

Thr Gly Ser Leu Ile Val Arg Asn Asn Ile Ala Met Asn Asn Ala Arg  
645 650 655

Tyr Asn Tyr Ile Leu Arg Thr Asn Pro Tyr Lys Phe Pro Ser Ser Ile  
660 665 670

Leu Phe Asp Asn Asn Tyr Ser Ile Arg Asp Asp Trp Glu Asn Lys Ile  
675 680 685

Lys Asp Phe Leu Gly Asp Thr Val Asn Ser Val Asn Tyr Lys Leu Leu  
690 695 700

Val Ser His Glu Thr Gly Pro Val Gln Lys Asp Leu Phe Phe Thr Arg  
705 710 715 720

Asp Asp Ser Gly Asn Ile Ile Tyr Pro Asp Phe Phe Leu Asn Ile Ile  
725 730 735

Asn Lys Phe Asn Glx Thr Met Pro  
740

<210> 47  
<211> 136  
<212> PRT

<213> Escherichia coli

<400> 47

Met Lys Thr Phe Ile Lys Thr Leu Leu Val Ala Val Thr Ile Leu Phe  
1 5 10 15

Ser Val Phe Ala Thr Ala Lys Gln Val Lys Leu Pro Asn Asn Ile Lys  
20 25 30

Tyr Val Asn Thr Thr Glu Ala Phe Ser Cys Thr Glu Ile Asp Gly Met  
35 40 45

Asn Cys Gln Thr Lys Asn Pro Phe Asn Tyr Lys Asp Asn Ser Tyr Val  
50 55 60

Phe Val Leu Glu Arg Gly Gly Ala Trp Cys Tyr Asp Tyr Thr Val Ser  
65 70 75 80

Val Leu Asn Leu Lys Thr Gly Lys Ala Gln Met Leu Glu Tyr Lys Asp  
85 90 95

Asn Gln Leu Cys Ser Gly Ser Asn Lys Pro Phe Phe Glu Ile Lys Asn  
100 105 110

Gly Val Pro Thr Val Gly Val Ile Asp Thr Ser Gly Lys Pro Val Val  
115 120 125

Val Ala Leu Asp Lys Leu Lys Thr  
130 135

<210> 48  
<211> 225  
<212> PRT

<213> Escherichia coli

<400> 48

Met Gln Leu Pro Val Lys Leu Leu Met Ser Leu Ile Ser Leu Val Ser  
1 5 10 15

Val Ile Ala Arg Ala Gly Lys Tyr Lys Asn Tyr Ile Arg Asp Glu Ile  
20 25 30

Lys Tyr Trp Arg Tyr Thr Ser Tyr Lys Gly Gly Glu Phe Pro Glu Gly  
35 40 45

Phe Thr Asp Glu Lys Phe Ser Ser Ala Ile Tyr Asn Gly Arg Ile Phe  
50 55 60

Thr Met Lys Arg Leu His Thr Leu Met Leu Phe Leu Ala Val Leu Phe  
65 70 75 80

Thr Gly Phe Asn Val Glu Ala Ala Ser Val Lys Gln Ala Leu Ser Cys  
85 90 95

Asp Pro Asn Ala Arg Ala Glu Gln Pro Gly Ala Cys Pro Thr Thr Tyr  
100 105 110

Glu Leu Tyr Glu Gly Asp Ala Ala Tyr Lys Ala Ala Leu Asp Lys Ala  
115 120 125

Leu Lys Pro Val Gly Leu Ser Gly Met Phe Gly Lys Gly Gly Tyr Met  
130 135 140

Asp Gly Pro Gly Gly Asn Val Thr Pro Val Thr Ile Asn Gly Thr Val  
145 150 155 160

Trp Leu Gln Gly Asp Gly Cys Lys Ala Asn Thr Cys Gly Trp Asp Phe  
165 170 175

Ile Val Thr Leu Tyr Asn Pro Lys Thr His Glu Val Val Gly Tyr Arg  
180 185 190

Tyr Phe Gly Leu Asp Asp Pro Ala Tyr Leu Val Trp Phe Gly Glu Ile  
195 200 205

Gly Val His Glu Phe Ala Tyr Leu Val Lys Asn Tyr Val Ala Ala Val  
210 215 220

Asn  
225

<210> 49  
<211> 721  
<212> PRT

<213> Escherichia coli

<400> 49

Met Lys Thr Gln Ile Thr Phe Ala Ala Leu Leu Pro Ala Leu Ala Ser  
1 5 10 15

Phe Ile Pro Leu His Ala His Ala Ser Ser Thr Ser Glu Asp Glu Met  
20 25 30

Ile Val Thr Gly Asn Thr Ala Ala Asp Thr Thr Asp Ser Ala Ala Gly  
35 40 45

Ala Gly Phe Lys Thr Asn Asp Ile Asp Val Gly Pro Leu Gly Thr Lys  
50 55 60

Ser Trp Ile Glu Thr Pro Tyr Ser Ser Thr Thr Val Thr Lys Glu Met  
65 70 75 80

Ile Glu Asn Gln Gln Ala Gln Ser Val Ser Glu Met Leu Lys Tyr Ser  
85 90 95

Pro Ser Thr Gln Met Gln Ala Arg Gly Gly Met Asp Val Gly Arg Pro  
100 105 110

Gln Ser Arg Gly Met Gln Gly Ser Val Val Ala Asn Ser Arg Leu Asp  
115 120 125

Gly Leu Asn Ile Val Ser Thr Thr Ala Phe Pro Val Glu Met Leu Glu

130

135

140

Arg Met Asp Val Leu Asn Ser Leu Thr Gly Ala Leu Tyr Gly Pro Ala  
145 150 155 160

Ser Pro Ala Gly Gln Phe Asn Phe Val Ala Lys Arg Pro Thr Glu Glu  
165 170 175

Thr Leu Arg Lys Val Thr Leu Gly Tyr Gln Ser Arg Ser Ala Phe Thr  
180 185 190

Gly His Ala Asp Leu Gly Gly His Phe Asp Glu Asn Lys Arg Phe Gly  
195 200 205

Tyr Arg Val Asn Leu Leu Asp Gln Glu Gly Glu Gly Asn Val Asp Asp  
210 215 220

Ser Thr Leu Arg Arg Lys Leu Val Ser Val Ala Leu Asp Trp Asn Ile  
225 230 235 240

Gln Pro Gly Thr Gln Leu Gln Leu Asp Ala Ser His Tyr Glu Phe Ile  
245 250 255

Gln Lys Gly Tyr Val Gly Ser Phe Asn Tyr Gly Pro Asn Val Lys Leu  
260 265 270

Pro Ser Ala Pro Asn Pro Lys Asp Lys Asn Leu Ala Leu Ser Thr Ala  
275 280 285

Gly Asn Asp Leu Thr Thr Asp Thr Ile Ser Thr Arg Leu Ile His Tyr  
290 295 300

Phe Asn Asp Asp Trp Ser Met Asn Ala Gly Val Gly Trp Gln Gln Ala  
305 310 315 320

Asp Arg Ala Met Arg Ser Val Ser Ser Lys Ile Leu Asn Asn Gln Gly  
325 330 335

Asp Ile Ser Arg Ser Met Lys Asp Ser Thr Ala Ala Gly Arg Phe Arg  
340 345 350

Val Leu Ser Asn Thr Ala Gly Leu Asn Gly His Ile Asp Thr Gly Ser  
355 360 365



Ile Gly His Asp Leu Ser Leu Ser Thr Thr Gly Tyr Val Trp Ser Leu  
370 375 380

Tyr Ser Ala Lys Gly Thr Gly Ser Ser Tyr Ser Trp Gly Thr Thr Asn  
385 390 395 400

Met Tyr His Pro Asp Ala Ile Asp Glu Gln Gly Asp Gly Lys Ile Arg  
405 410 415

Thr Gly Gly Pro Arg Tyr Arg Ser Ser Val Asn Thr Gln Gln Ser Val  
420 425 430

Thr Leu Gly Asp Thr Val Thr Phe Thr Pro Gln Trp Ser Ala Met Phe  
435 440 445

Tyr Leu Ser Gln Ser Trp Leu Gln Thr Lys Asn Tyr Asp Lys His Gly  
450 455 460

Asn Gln Thr Asn Gln Val Asp Glu Asn Gly Leu Ser Pro Asn Ala Ala  
465 470 475 480

Leu Met Tyr Lys Ile Thr Pro Asn Thr Met Ala Tyr Val Ser Tyr Ala  
485 490 495

Asp Ser Leu Glu Gln Gly Gly Thr Ala Pro Thr Asp Glu Ser Val Lys  
500 505 510

Asn Ala Gly Gln Thr Leu Asn Pro Tyr Arg Ser Lys Gln Tyr Glu Val  
515 520 525

Gly Leu Lys Ser Asp Ile Gly Glu Met Asn Leu Gly Ala Ala Leu Phe  
530 535 540

Arg Leu Glu Arg Pro Phe Ala Tyr Leu Asp Thr Asp Asn Val Tyr Lys  
545 550 555 560

Glu Gln Gly Asn Gln Val Asn Asn Gly Leu Glu Leu Thr Ala Ala Gly  
565 570 575

Asn Val Trp Gln Gly Leu Asn Ile Tyr Ser Gly Val Thr Phe Leu Asp  
580 585 590

Pro Lys Leu Lys Asp Thr Ala Asn Ala Ser Thr Ser Asn Lys Gln Val  
595 600 605

Val Gly Val Pro Lys Val Gln Ala Asn Leu Leu Ala Glu Tyr Ser Leu  
610 615 620

Pro Ser Ile Pro Glu Trp Val Tyr Ser Ala Asn Val His Tyr Thr Gly  
625 630 635 640

Lys Arg Ala Ala Asn Asp Thr Asn Thr Ser Tyr Ala Ser Ser Tyr Thr  
645 650 655

Thr Trp Asp Leu Gly Thr Arg Tyr Thr Thr Lys Val Ser Asn Val Pro  
660 665 670

Thr Thr Phe Arg Val Val Val Asn Asn Val Phe Asp Lys His Tyr Trp  
675 680 685

Ala Ser Ile Phe Pro Ser Gly Thr Asp Gly Asp Asn Gly Ser Pro Ser  
690 695 700

Ala Phe Ile Gly Gly Gly Arg Glu Val Arg Ala Ser Val Thr Phe Asp  
705 710 715 720

Phe

<210> 50

<211> 669

<212> PRT

<213> Escherichia coli

<400> 50

Met Lys Asn Ile Thr Leu Trp Gln Arg Leu Arg Gln Val Ser Ile Ser  
1 5 10 15

Thr Ser Leu Arg Cys Ala Phe Leu Met Gly Ala Leu Leu Thr Leu Ile  
20 25 30

Val Ser Ser Val Ser Leu Tyr Ser Trp His Glu Gln Ser Ser Gln Ile  
35 40 45

Arg Tyr Ser Leu Asp Lys Tyr Phe Pro Arg Ile His Ser Ala Phe Leu  
50 55 60

Ile Glu Gly Asn Leu Asn Leu Val Val Asp Gln Leu Asn Glu Phe Leu  
65 70 75 80

Gln Ala Pro Asn Thr Thr Val Arg Leu Gln Leu Arg Thr Gln Ile Ile  
85 90 95

Gln His Leu Asp Thr Ile Glu Arg Leu Ser Arg Gly Leu Ser Ser Arg  
100 105 110

Glu Arg Gln Gln Leu Thr Val Ile Leu Gln Asp Ser Arg Ser Leu Leu  
115 120 125

Ser Glu Leu Asp Arg Ala Leu Tyr Asn Met Phe Leu Leu Arg Glu Lys  
130 135 140

Val Ser Glu Leu Ser Ala Arg Ile Asp Trp Leu His Asp Asp Phe Thr  
145 150 155 160

Thr Glu Leu Asn Ser Leu Val Gln Asp Phe Thr Trp Gln Gln Gly Thr  
165 170 175

Leu Leu Asp Gln Ile Ala Ser Arg Gln Gly Asp Thr Ala Gln Tyr Leu  
180 185 190

Lys Arg Ser Arg Glu Val Gln Asn Glu Gln Gln Gln Val Tyr Thr Leu  
195 200 205

Ala Arg Ile Glu Asn Gln Ile Val Asp Asp Leu Arg Asp Arg Leu Asn  
210 215 220

Glu Leu Lys Ser Gly Arg Asp Asp Asp Ile Gln Val Glu Thr His Leu  
225 230 235 240

Arg Tyr Phe Glu Asn Leu Lys Lys Thr Ala Asp Glu Asn Ile Arg Met  
245 250 255

Leu Asp Asp Trp Pro Gly Thr Ile Thr Leu Arg Gln Thr Ile Asp Glu  
260 265 270

Leu Leu Asp Met Gly Ile Val Lys Asn Lys Met Pro Asp Thr Met Arg

275

280

285

Glu Tyr Val Ala Ala Gln Lys Ala Leu Glu Asp Ala Ser Arg Thr Arg  
290 295 300

Glu Ala Thr Gln Gly Arg Phe Arg Thr Leu Leu Glu Ala Gln Leu Gly  
305 310 315 320

Ser Thr His Gln Gln Met Gln Met Phe Asn Gln Arg Met Glu Gln Ile  
325 330 335

Val His Val Ser Gly Gly Leu Ile Leu Val Ala Thr Ala Leu Ala Leu  
340 345 350

Leu Leu Ala Trp Val Phe Asn His Tyr Phe Ile Arg Ser Arg Leu Val  
355 360 365

Lys Arg Phe Thr Leu Leu Asn Gln Ala Val Val Gln Ile Gly Leu Gly  
370 375 380

Gly Thr Glu Thr Thr Ile Pro Val Tyr Gly Asn Asp Glu Leu Gly Arg  
385 390 395 400

Ile Ala Gly Leu Leu Arg His Thr Leu Gly Gln Leu Asn Val Gln Lys  
405 410 415

Gln Gln Leu Glu Gln Glu Ile Thr Asp Arg Lys Val Ile Glu Ala Asp  
420 425 430

Leu Arg Ala Thr Gln Asp Glu Leu Ile Gln Thr Ala Lys Leu Ala Val  
435 440 445

Val Gly Gln Thr Met Thr Thr Leu Ala His Glu Ile Asn Gln Pro Leu  
450 455 460

Asn Ala Leu Ser Met Tyr Leu Phe Thr Ala Arg Arg Ala Ile Glu Gln  
465 470 475 480

Thr Gln Lys Glu Gln Ala Ser Met Met Leu Gly Lys Ala Glu Gly Val  
485 490 495

Ile Ser Arg Ile Asp Ala Ile Ile Arg Ser Leu Arg Gln Phe Thr Arg  
500 505 510

Arg Ala Glu Leu Glu Thr Ser Leu His Ala Val Asp Leu Ala Gln Met  
515 520 525

Phe Ser Ala Ala Trp Glu Leu Leu Ala Met Arg His Arg Ser Leu Gln  
530 535 540

Ala Thr Leu Val Leu Pro Gln Gly Thr Ala Thr Val Ser Gly Asp Glu  
545 550 555 560

Val Arg Thr Gln Gln Val Leu Val Asn Val Leu Ala Asn Ala Leu Asp  
565 570 575

Val Cys Gly Gln Gly Ala Val Ile Thr Val Asn Trp Gln Met Gln Gly  
580 585 590

Lys Thr Leu Asn Val Phe Ile Gly Asp Asn Gly Pro Gly Trp Pro Glu  
595 600 605

Ala Leu Leu Pro Ser Leu Leu Lys Pro Phe Thr Thr Ser Lys Glu Val  
610 615 620

Gly Leu Gly Ile Gly Leu Ser Ile Cys Val Ser Leu Met Glu Gln Met  
625 630 635 640

Lys Gly Glu Leu Arg Leu Ala Ser Thr Met Thr Arg Asn Ala Cys Val  
645 650 655

Val Leu Gln Phe Arg Leu Thr Asp Val Glu Asp Ala Lys  
660 665

<210> 51  
<211> 753  
<212> PRT

<213> Escherichia coli

<400> 51

Met Asn Val Ile Lys Leu Ala Ile Gly Ser Gly Ile Leu Leu Leu Ser  
1 5 10 15

Cys Gly Ala Tyr Ser Gln Ser Ile Ser Glu Lys Thr Asn Ser Asp Lys  
20 25 30

Lys Gly Ala Ala Glu Phe Ser Pro Leu Ser Val Ser Val Gly Lys Thr  
35 40 45

Thr Ser Glu Gln Glu Ala Leu Glu Lys Thr Gly Ala Thr Ser Ser Arg  
50 55 60

Thr Thr Asp Lys Asn Leu Gln Ser Leu Asp Ala Thr Val Arg Ser Met  
65 70 75 80

Pro Gly Thr Tyr Thr Gln Ile Asp Pro Gly Gln Gly Ala Ile Ser Val  
85 90 95

Asn Ile Arg Gly Met Ser Gly Phe Gly Arg Val Asn Thr Met Val Asp  
100 105 110

Gly Ile Thr Gln Ser Phe Tyr Gly Thr Ser Thr Ser Gly Thr Thr Thr  
115 120 125

His Gly Ser Thr Asn Asn Met Ala Gly Val Leu Ile Asp Pro Asn Leu  
130 135 140

Leu Val Ala Val Asp Val Thr Arg Gly Asp Ser Ser Gly Ser Glu Gly  
145 150 155 160

Ile Asn Ala Leu Ala Gly Ser Ala Asn Met Arg Thr Ile Gly Val Asp  
165 170 175

Asp Val Ile Phe Asn Gly Asn Thr Tyr Gly Leu Arg Ser Arg Phe Ser  
180 185 190

Val Gly Ser Asn Gly Leu Gly Arg Ser Gly Met Ile Ala Leu Gly Gly  
195 200 205

Lys Ser Asp Ala Phe Thr Asp Thr Gly Ser Ile Gly Val Met Ala Ala  
210 215 220

Val Ser Gly Ser Ser Val Tyr Ser Asn Phe Ser Asn Gly Ser Gly Ile  
225 230 235 240

Asn Ser Lys Glu Phe Gly Tyr Asp Lys Tyr Met Lys Gln Asn Pro Lys  
245 250 255

Ser Gln Leu Tyr Lys Met Asp Ile Arg Pro Asp Glu Phe Asn Ser Phe  
260 265 270

Glu Leu Ser Ala Arg Thr Tyr Glu Asn Lys Phe Thr Arg Arg Asp Ile  
275 280 285

Thr Ser Asp Asp Tyr Tyr Ile Lys Tyr His Tyr Thr Pro Phe Ser Glu  
290 295 300

Leu Ile Asp Phe Asn Val Thr Ala Ser Thr Ser Arg Gly Asn Gln Lys  
305 310 315 320

Tyr Arg Asp Gly Ser Leu Tyr Thr Phe Tyr Lys Thr Ser Ala Gln Asn  
325 330 335

Arg Ser Asp Ala Leu Asp Ile Asn Asn Thr Ser Arg Phe Thr Val Ala  
340 345 350

Asp Asn Asp Leu Glu Phe Met Leu Gly Ser Lys Leu Met Arg Thr Arg  
355 360 365

Tyr Asp Arg Thr Ile His Ser Ala Ala Gly Asp Pro Lys Ala Asn Gln  
370 375 380

Glu Ser Ile Glu Asn Asn Pro Phe Ala Pro Ser Gly Gln Gln Asp Ile  
385 390 395 400

Ser Ala Leu Tyr Thr Gly Leu Lys Val Thr Arg Gly Ile Trp Glu Ala  
405 410 415

Asp Phe Asn Leu Asn Tyr Thr Arg Asn Arg Ile Thr Gly Tyr Lys Pro  
420 425 430

Ala Cys Asp Ser Arg Val Ile Cys Val Pro Gln Gly Ser Tyr Asp Ile  
435 440 445

Asp Asp Lys Glu Gly Gly Phe Asn Pro Ser Val Gln Leu Ser Ala Gln  
450 455 460

Val Thr Pro Trp Leu Gln Pro Phe Ile Gly Tyr Ser Lys Ser Met Arg  
465 470 475 480

Ala Pro Asn Ile Gln Glu Met Phe Phe Ser Asn Ser Gly Gly Ala Ser

485

490

495

Met Asn Pro Phe Leu Lys Pro Glu Arg Ala Glu Thr Trp Gln Ala Gly  
500 505 510

Phe Asn Ile Asp Thr Arg Asp Leu Leu Val Glu Gln Asp Ala Leu Arg  
515 520 525

Phe Lys Ala Leu Ala Tyr Arg Ser Arg Ile Gln Asn Tyr Ile Tyr Ser  
530 535 540

Glu Ser Tyr Leu Val Cys Ser Gly Gly Arg Lys Cys Ser Leu Pro Glu  
545 550 555 560

Val Ile Gly Asn Gly Trp Glu Gly Ile Ser Asp Glu Tyr Ser Asp Asn  
565 570 575

Met Tyr Ile Tyr Val Asn Ser Ala Ser Asp Val Ile Ala Lys Gly Phe  
580 585 590

Glu Leu Glu Met Asp Tyr Asp Ala Gly Phe Ala Phe Gly Arg Leu Ser  
595 600 605

Phe Ser Gln Gln Gln Thr Asp Gln Pro Thr Ser Ile Ala Ser Thr His  
610 615 620

Phe Gly Ala Gly Asp Ile Thr Glu Leu Pro Arg Lys Tyr Met Thr Leu  
625 630 635 640

Asp Thr Gly Val Arg Phe Phe Asp Asn Ala Leu Thr Leu Gly Thr Ile  
645 650 655

Ile Lys Tyr Thr Gly Lys Ala Arg Arg Leu Ser Pro Asp Phe Glu Gln  
660 665 670

Asp Glu His Thr Gly Ala Ile Ile Lys Gln Asp Leu Pro Gln Ile Pro  
675 680 685

Thr Ile Ile Asp Leu Tyr Gly Thr Tyr Glu Tyr Asn Arg Asn Leu Thr  
690 695 700

Leu Lys Leu Ser Val Gln Asn Leu Met Asn Arg Asp Tyr Ser Glu Ala  
705 710 715 720



Leu Asn Lys Leu Asn Met Met Pro Gly Leu Gly Asp Glu Thr His Pro  
725 730 735

Ala Asn Ser Ala Arg Gly Arg Thr Trp Ile Phe Gly Gly Asp Ile Arg  
740 745 750

Phe

<210> 52  
<211> 133  
<212> PRT

<213> Escherichia coli

<400> 52

Met Ser Ser Lys Thr Lys Cys Trp Leu Trp Met Leu Leu Val Ile Leu  
1 5 10 15

Ser Glu Thr Ser Ala Thr Ser Thr Leu Lys Met Phe Asp Asn Ser Glu  
20 25 30

Gly Met Thr Lys Thr Leu Leu Leu Ala Leu Ile Val Val Leu Tyr Cys  
35 40 45

Ile Cys Tyr Tyr Ser Leu Ser Arg Ala Val Lys Asp Ile Pro Val Gly  
50 55 60

Leu Ala Tyr Ala Thr Trp Ser Gly Thr Gly Ile Leu Met Val Ser Thr  
65 70 75 80

Leu Gly Ile Leu Phe Tyr Gly Gln His Pro Asp Thr Ala Ala Ile Ile  
85 90 95

Gly Met Val Ile Ile Ala Ser Gly Ile Ile Ile Met Asn Leu Phe Ser  
100 105 110

Lys Met Gly Ser Glu Glu Ala Glu Glu Thr Pro Val Thr Asn Leu Asp  
115 120 125

Lys Lys Ile Ala Asn  
130

<210> 53  
<211> 286  
<212> PRT

<213> Escherichia coli

<400> 53

Met Tyr Ile Lys Lys His Trp Ile Ala Leu Ser Ile Leu Leu Ile Pro  
1 5 10 15

Cys Ile Gly Asn Ala Gln Glu Ile Lys Ile Asp Glu Ser Trp Leu His  
20 25 30

Gln Ser Leu Asn Val Ile Gly Arg Thr Asp Ser Arg Phe Gly Pro Arg  
35 40 45

Leu Thr Asn Asp Leu Tyr Pro Glu Tyr Thr Val Ala Gly Arg Lys Asp  
50 55 60

Trp Phe Asp Phe Tyr Gly Tyr Val Asp Leu Pro Lys Phe Phe Gly Val  
65 70 75 80

Gly Ser His Tyr Asp Val Gly Ile Trp Asp Glu Gly Ser Pro Leu Phe  
85 90 95

Thr Glu Ile Glu Pro Arg Phe Ser Ile Asp Lys Leu Thr Gly Leu Asn  
100 105 110

Leu Ala Phe Gly Pro Phe Lys Glu Trp Phe Ile Ala Asn Asn Tyr Val  
115 120 125

Tyr Asp Met Gly Asp Asn Gln Ser Ser Arg Gln Ser Thr Trp Tyr Met  
130 135 140

Gly Leu Gly Thr Asp Ile Asp Thr Gly Leu Pro Ile Lys Leu Ser Ala  
145 150 155 160

Asn Ile Tyr Ala Lys Tyr Gln Trp Gln Asn Tyr Gly Ala Ala Asn Glu  
165 170 175

Asn Glu Trp Asp Gly Tyr Arg Phe Lys Ile Lys Tyr Ser Ile Pro Leu  
180 185 190

Thr Asn Leu Phe Gly Gly Arg Leu Val Tyr Asn Ser Phe Thr Asn Phe  
195 200 205

Asp Phe Gly Ser Asp Leu Ala Asp Lys Ser His Asn Asn Lys Arg Thr  
210 215 220

Ser Asn Ala Ile Ala Ser Ser His Ile Leu Ser Leu Leu Tyr Glu His  
225 230 235 240

Trp Lys Phe Ala Phe Thr Leu Arg Tyr Phe His Asn Gly Gly Gln Trp  
245 250 255

Asn Ala Gly Glu Lys Val Asn Phe Gly Asp Gly Pro Phe Glu Leu Lys  
260 265 270

Asn Thr Gly Trp Gly Thr Tyr Thr Thr Ile Gly Tyr Gln Phe  
275 280 285

<210> 54  
<211> 172  
<212> PRT

<213> Escherichia coli

<400> 54

Met Arg Ile Ala Pro Arg Thr Phe Phe Ala Ile Ser Ala Leu Ala Phe  
1 5 10 15

Ile Val Ala Ser Gly Phe Ser Phe Trp Arg Leu Ser Pro Ala Glu Asn  
20 25 30

Thr Gly Ile Met Ser Cys Ser Thr Lys Gly Ile Met Arg Phe Glu Asn  
35 40 45

Met Glu Lys Glu Asn Val Asn Gly Asn Ile His Phe Asn Phe Gly Ser  
50 55 60

Gln Gly Lys Gly Ser Met Val Leu Glu Gly Tyr Thr Asp Ser Ala Ala  
65 70 75 80

Gly Trp Leu Tyr Leu Gln Arg Tyr Val Lys Phe Thr Tyr Thr Ser Lys  
85 90 95

Arg Val Ser Ala Thr Glu Arg His Tyr Arg Ile Ser Gln Trp Glu Ser

100

105

110

Ser Ala Ser Ser Ile Asp Glu Ser Pro Asp Val Ile Phe Asp Tyr Phe  
 115 120 125

Met Arg Glu Met Ser Asp Ser His Asp Gly Leu Phe Leu Asn Ala Gln  
 130 135 140

Lys Leu Asn Asp Lys Ala Ile Leu Leu Ser Ser Ile Asn Ser Pro Leu  
 145 150 155 160

Trp Ile Cys Thr Leu Lys Ser Gly Ser Lys Leu Asp  
 165 170

&lt;210&gt; 55

&lt;211&gt; 182

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 55

Met Lys Ile Lys Val Ile Ala Leu Ala Thr Phe Val Ser Ala Val Phe  
 1 5 10 15

Ala Gly Ser Ala Met Ala Tyr Asp Gly Thr Ile Thr Phe Thr Gly Lys  
 20 25 30

Val Val Ala Gln Thr Cys Thr Val Asn Thr Ser Asp Lys Asp Leu Ala  
 35 40 45

Val Thr Leu Pro Thr Val Ala Thr Ser Ser Leu Lys Asp Asn Ala Ala  
 50 55 60

Thr Ser Gly Leu Thr Pro Phe Ala Ile Arg Leu Thr Gly Cys Ala Thr  
 65 70 75 80

Gly Met Asn Ser Ala Gln Asn Val Lys Ala Tyr Phe Glu Pro Ser Ser  
 85 90 95

Asn Ile Asp Leu Ala Thr His Asn Leu Lys Asn Thr Ala Thr Pro Thr  
 100 105 110

Lys Ala Asp Asn Val Gln Ile Gln Leu Leu Asn Ser Asn Gly Thr Ser  
 115 120 125

Thr Ile Leu Leu Gly Glu Ala Asp Asn Gly Gln Asp Val Gln Ser Glu  
130 135 140

Thr Ile Gly Ser Asp Gly Ser Ala Thr Leu Arg Tyr Met Ala Gln Tyr  
145 150 155 160

Tyr Ala Thr Gly Gln Ser Thr Ala Gly Asp Val Lys Ala Thr Val His  
165 170 175

Tyr Thr Ile Ala Tyr Glu  
180

<210> 56

<211> 359

<212> PRT

<213> Escherichia coli

<400> 56

Met Lys Arg Ile Phe Phe Ile Pro Leu Phe Leu Ile Leu Leu Pro Lys  
1 5 10 15

Leu Ala Val Ala Gly Pro Asp Asp Tyr Val Pro Ser Gln Ile Ala Val  
20 25 30

Asn Thr Ser Thr Leu Pro Gly Val Val Ile Gly Pro Ala Asp Ala His  
35 40 45

Thr Tyr Pro Arg Val Ile Gly Glu Leu Ala Gly Thr Ser Asn Gln Tyr  
50 55 60

Val Phe Asn Gly Gly Ala Ile Ala Leu Met Arg Gly Lys Phe Thr Pro  
65 70 75 80

Ala Leu Pro Lys Ile Gly Ser Ile Thr Val Tyr Phe Pro Ser Arg Lys  
85 90 95

Gln Arg Asp Ser Ser Asp Phe Asp Ile Tyr Asp Ile Gly Val Ser Gly  
100 105 110

Leu Gly Ile Ile Ile Gly Met Ala Gly Tyr Trp Pro Ala Thr Pro Leu  
115 120 125

Val Pro Ile Asn Ser Ser Gly Ile Tyr Ile Asp Pro Val Gly Ala Asn  
130 135 140

Thr Asn Pro Asn Thr Tyr Asn Gly Ala Thr Ala Ser Phe Gly Ala Arg  
145 150 155 160

Leu Phe Val Ala Phe Val Ala Thr Gly Arg Leu Pro Asn Gly Tyr Ile  
165 170 175

Thr Ile Pro Thr Arg Gln Leu Gly Thr Ile Leu Leu Glu Ala Lys Arg  
180 185 190

Thr Ser Leu Asn Asn Lys Gly Leu Thr Ala Pro Val Met Leu Asn Gly  
195 200 205

Gly Arg Ile Gln Val Gln Ser Gln Thr Cys Thr Met Gly Gln Lys Asn  
210 215 220

Tyr Val Val Pro Leu Asn Thr Val Tyr Gln Ser Gln Phe Thr Ser Leu  
225 230 235 240

Tyr Lys Glu Ile Gln Gly Gly Lys Ile Asp Ile His Leu Gln Cys Pro  
245 250 255

Asp Gly Ile Asp Val Tyr Ala Thr Leu Thr Asp Ala Ser Gln Pro Val  
260 265 270

Asn Arg Thr Asp Ile Leu Thr Leu Ser Ser Glu Ser Thr Ala Lys Gly  
275 280 285

Phe Gly Ile Arg Leu Tyr Lys Asp Ser Asp Val Thr Ala Ile Ser Tyr  
290 295 300

Gly Glu Asp Ser Pro Val Lys Gly Asn Gly Ser Gln Trp His Phe Ser  
305 310 315 320

Asp Tyr Arg Gly Glu Val Asn Pro His Ile Asn Leu Arg Ala Asn Tyr  
325 330 335

Ile Lys Ile Ala Asp Ala Thr Thr Pro Gly Ser Val Lys Ala Ile Ala  
340 345 350

Thr Ile Thr Phe Ser Tyr Gln  
355

<210> 57  
<211> 844  
<212> PRT

<213> Escherichia coli

<400> 57

Met Asn Ala Asn Asn Leu Ser Cys Leu Ile Tyr Cys Arg Cys Ser Leu  
1 5 10 15

Leu Leu Phe Ala Ala Leu Gly Leu Thr Val Thr Asn His Ser Phe Ala  
20 25 30

Ala Glu Glu Ala Glu Phe Asp Ser Glu Phe Leu His Leu Asp Lys Gly  
35 40 45

Ile Asn Ala Ile Asp Ile Arg Arg Phe Ser His Gly Asn Pro Val Pro  
50 55 60

Glu Gly Arg Tyr Tyr Ser Asp Ile Tyr Val Asn Asn Val Trp Lys Gly  
65 70 75 80

Lys Ala Asp Leu Gln Tyr Leu Arg Thr Ala Asn Thr Gly Ala Pro Thr  
85 90 95

Leu Cys Leu Thr Pro Glu Leu Leu Ser Leu Ile Asp Leu Val Lys Asp  
100 105 110

Thr Met Ser Gly Asn Thr Ser Cys Phe Pro Ala Ser Thr Gly Leu Ser  
115 120 125

Ser Ala Arg Ile Asn Phe Asp Leu Ser Thr Leu Arg Leu Asn Ile Glu  
130 135 140

Ile Pro Gln Ala Leu Leu Asn Thr Arg Pro Arg Gly Tyr Ile Ser Pro  
145 150 155 160

Ala Gln Trp Gln Ser Gly Val Pro Ala Ala Phe Ile Asn Tyr Asp Ala  
165 170 175

Asn Tyr Tyr Gln Tyr Ser Ser Ser Gly Thr Ser Asn Glu Gln Thr Tyr

180

185

190

Leu Gly Leu Lys Ala Gly Phe Asn Leu Trp Gly Trp Ala Leu Arg His  
 195 200 205

Arg Gly Ser Glu Ser Trp Asn Asn Ser Tyr Pro Ala Gly Tyr Gln Asn  
 210 215 220

Ile Glu Thr Ser Ile Met His Asp Leu Ala Pro Leu Arg Ala Gln Phe  
 225 230 235 240

Thr Leu Gly Asp Phe Tyr Thr Asn Gly Glu Leu Met Asp Ser Leu Ser  
 245 250 255

Leu Arg Gly Val Arg Leu Ala Ser Asp Glu Arg Met Leu Pro Gly Ser  
 260 265 270

Leu Arg Gly Tyr Ala Pro Ala Val Arg Gly Ile Ala Asn Ser Asn Ala  
 275 280 285

Lys Val Thr Ile Tyr Gln Asn Ala His Ile Leu Tyr Glu Thr Thr Val  
 290 295 300

Pro Ala Gly Pro Phe Val Ile Asn Asp Leu Tyr Pro Ser Gly Tyr Ala  
 305 310 315 320

Gly Asp Leu Leu Val Lys Ile Thr Glu Ser Asn Gly Gln Thr Arg Met  
 325 330 335

Phe Thr Val Pro Phe Ala Ala Val Ala Gln Leu Ile Arg Pro Gly Phe  
 340 345 350

Ser Arg Trp Gln Met Ser Val Gly Lys Tyr Arg Tyr Ala Asn Lys Thr  
 355 360 365

Tyr Asn Asp Leu Ile Ala Gln Gly Thr Tyr Gln Tyr Gly Leu Thr Asn  
 370 375 380

Asp Ile Thr Leu Asn Ser Gly Leu Thr Thr Ala Ser Gly Tyr Thr Ala  
 385 390 395 400

Gly Leu Ala Gly Leu Ala Phe Asn Thr Pro Leu Gly Ala Ile Ala Ser  
 405 410 415



Asp Ile Thr Leu Ser Arg Thr Ala Phe Arg Tyr Ser Gly Val Thr Arg  
420 425 430

Lys Gly Tyr Ser Leu His Ser Ser Tyr Ser Ile Asn Ile Pro Ala Ser  
435 440 445

Asn Thr Asn Ile Thr Leu Ala Ala Tyr Arg Tyr Ser Ser Lys Asp Phe  
450 455 460

Tyr His Leu Lys Asp Ala Leu Ser Ala Asn His Asn Ala Phe Ile Asp  
465 470 475 480

Asp Val Ser Val Lys Ser Thr Ala Phe Tyr Arg Pro Arg Asn Gln Phe  
485 490 495

Gln Ile Ser Ile Asn Gln Glu Leu Gly Glu Lys Trp Gly Gly Met Tyr  
500 505 510

Leu Thr Gly Thr Thr Tyr Asn Tyr Trp Gly His Lys Gly Ser Arg Asn  
515 520 525

Glu Tyr Gln Ile Gly Tyr Ser Asn Phe Trp Lys Gln Leu Gly Tyr Gln  
530 535 540

Ile Gly Leu Ser Gln Ser Arg Asp Asn Glu Gln Gln Arg Arg Asp Asp  
545 550 555 560

Arg Phe Tyr Ile Asn Phe Thr Leu Pro Leu Gly Gly Ser Val Gln Ser  
565 570 575

Pro Val Phe Ser Thr Val Leu Asn Tyr Ser Lys Glu Glu Lys Asn Ser  
580 585 590

Ile Gln Thr Ser Ile Ser Gly Thr Gly Gly Glu Asp Asn Gln Phe Ser  
595 600 605

Tyr Gly Ile Ser Gly Asn Ser Gln Glu Asn Gly Pro Ser Gly Tyr Ala  
610 615 620

Met Asn Gly Gly Tyr Arg Ser Pro Tyr Val Asn Ile Thr Thr Thr Val  
625 630 635 640

Gly His Asp Thr Gln Asn Asn Asn Gln Arg Ser Phe Gly Ala Ser Gly  
645 650 655

Ala Val Val Ala His Pro Tyr Gly Val Thr Leu Ser Asn Asp Leu Ser  
660 665 670

Asp Thr Phe Ala Ile Ile His Ala Glu Gly Ala Gln Gly Ala Val Ile  
675 680 685

Asn Asn Ala Ser Gly Ser Arg Leu Asp Phe Trp Gly Asn Gly Val Val  
690 695 700

Pro Tyr Val Thr Pro Tyr Glu Lys Asn Gln Ile Ser Ile Asp Pro Ser  
705 710 715 720

Asn Leu Asp Leu Asn Val Glu Leu Ser Ala Thr Glu Gln Glu Ile Ile  
725 730 735

Pro Arg Ala Asn Ser Ala Thr Leu Val Lys Phe Asp Thr Lys Thr Gly  
740 745 750

Arg Ser Leu Leu Phe Asp Ile Arg Met Ser Thr Gly Asn Pro Pro Pro  
755 760 765

Met Ala Ser Glu Val Leu Asp Glu His Gly Gln Leu Ala Gly Tyr Val  
770 775 780

Ala Gln Ala Gly Lys Val Phe Thr Arg Gly Leu Pro Glu Lys Gly His  
785 790 795 800

Leu Ser Val Val Trp Gly Pro Asp Asn Lys Asp Arg Cys Ser Phe Val  
805 810 815

Tyr His Val Ala His Asn Lys Asp Asp Met Gln Ser Gln Leu Val Pro  
820 825 830

Val Leu Cys Ile Gln His Pro Asn Gln Glu Lys Thr  
835 840

<210> 58  
<211> 277  
<212> PRT

<213> Escherichia coli

<400> 58

Met Val Lys Cys His Thr Leu Ile Asn Arg Arg Asn Lys Cys Leu Leu  
1 5 10 15

Ile Val Phe Ile Val Leu Ile Gly Trp Ile Ile Phe Arg Pro Lys Ala  
20 25 30

Tyr Thr Tyr Ser Leu Asn Asp Lys Glu Lys Glu Met Leu Ile Met Leu  
35 40 45

Ser Gln His Pro Glu Thr Arg Tyr Phe Gly Phe Tyr Ser Ile Glu Leu  
50 55 60

Pro Ala Asp Tyr Lys Pro Thr Gly Met Val Met Phe Ile Gln Gly Ser  
65 70 75 80

Ala Met Ile Pro Val Glu Thr Lys Leu Gln Tyr Tyr Pro Pro Phe Leu  
85 90 95

Gln Tyr Met Thr Arg Tyr Glu Ala Glu Leu Lys Asn Thr Ser Ala Leu  
100 105 110

Asp Pro Leu Asp Thr Pro Tyr Leu Lys Gln Val His Pro Leu Ser Pro  
115 120 125

Pro Met Asn Gly Val Ile Phe Glu Arg Met Lys Ala Lys Tyr Thr Pro  
130 135 140

Asp Phe Ala Arg Val Leu Asp Ala Trp Lys Trp Glu Asn Gly Val Thr  
145 150 155 160

Phe Ser Val Lys Ile Glu Ala Lys Asp Gly Arg Ala Thr Arg Tyr Asp  
165 170 175

Gly Ile Ser Lys Ile Ala Glu Tyr Ser Tyr Gly Tyr Asn Ile Pro Glu  
180 185 190

Lys Lys Val Gln Leu Leu Thr Ile Leu Ser Gly Leu Gln Pro Arg Ala  
195 200 205

Asp Asn Gln Pro Pro Ser Glu Asn Lys Leu Ala Ile Gln Tyr Ala Gln

210

215

220

Val Asp Ala Ser Leu Leu Gly Glu Tyr Glu Leu Ser Val Asp Tyr Lys  
 225 230 235 240

Asn Ser Asn Asn Ile Lys Ile Ser Leu Gln Thr Asp Asn Asn Ser Tyr  
 245 250 255

Ile Asp Ser Leu Leu Asp Ile Arg Tyr Pro Ser Asn Gly Asn Arg Ala  
 260 265 270

Trp Tyr Asn Ser Ile  
 275

&lt;210&gt; 59

&lt;211&gt; 366

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 59

Met Leu Pro Glu Pro Val Tyr Arg Arg Trp Ile Ile Leu Leu Ile Ser  
 1 5 10 15

Met Leu Thr Val Gly Thr Leu Phe Ile Leu Ser Val Trp Asn Ser Ala  
 20 25 30

Thr Tyr Trp Asp Ile Phe Ile Tyr Gly Val Leu Pro Met Leu Phe Leu  
 35 40 45

Trp Leu Cys Leu Phe Gly Ile Ala Leu Asn Lys Tyr Glu Gln Ser Val  
 50 55 60

Ala Ala Cys Ile Ser Trp Glu Ser Glu Arg Gln Gln Val Lys Gln Leu  
 65 70 75 80

Trp Gln His Trp Ser Gln Lys Gln Leu Ala Ile Val Gly Asn Val Leu  
 85 90 95

Phe Thr Pro Glu Glu Lys Gly Met Ser Val Leu Leu Gly Pro Gln Glu  
 100 105 110

Glu Ile Pro Ala Tyr Pro Lys Lys Ala Arg Pro Leu Phe Ser Ala Ser  
 115 120 125

Arg Tyr Ser Leu Ser Ser Ile Phe His Asp Ile His Gln Gln Leu Thr  
130 135 140

Gln Gln Phe Pro Asp Tyr Arg His Tyr Leu His Thr Ile Tyr Val Leu  
145 150 155 160

Gln Pro Glu Lys Trp Arg Gly Glu Thr Val Arg Gln Ala Ile Phe His  
165 170 175

Gln Trp Asp Leu Val Pro Glu Arg Thr Asn Thr Leu Asn Gln Ile Gln  
180 185 190

Ser Leu Tyr Asp Glu Arg Phe Asp Gly Leu Ile Leu Val Val Cys Leu  
195 200 205

Gln Asn Trp Pro Glu Asn Lys Pro Glu Asp Thr Ser Glu Leu Val Ser  
210 215 220

Ala Gln Leu Ile Ser Ser Ser Ser Phe Val Arg Gln His Gln Ile Pro  
225 230 235 240

Val Ile Ala Gly Leu Gly Arg Val Met Pro Leu Glu Pro Glu Glu Leu  
245 250 255

Glu His Asn Leu Asp Val Leu Phe Glu Tyr Asn Gln Leu Asp Asn Lys  
260 265 270

Gln Leu Gln His Val Trp Val Ser Gly Leu Asp Glu Gly Thr Ile Glu  
275 280 285

Asn Leu Met Gln Tyr Ala Glu Gln His Gln Trp Ser Leu Pro Lys Lys  
290 295 300

Arg Pro Leu His Met Ile Asp His Ser Phe Gly Pro Thr Gly Glu Phe  
305 310 315 320

Ile Phe Pro Val Ser Leu Ala Met Leu Ser Glu Ala Ala Lys Glu Thr  
325 330 335

Glu Gln Asn His Leu Ile Ile Tyr Gln Ser Ala Gln Tyr Ala Gln Lys  
340 345 350

Lys Ser Leu Cys Leu Ile Thr Arg Lys Leu Tyr Leu Arg Thr  
355 360 365

<210> 60  
<211> 260  
<212> PRT

<213> Escherichia coli

<400> 60

Met Leu Asn Arg Lys Leu Asn Ile Arg Leu Arg His Ser Leu Asn Ser  
1 5 10 15

His Cys Ile Pro Ser Ile Ile Ile Asn Asn Thr Val Arg Ser Phe Gln  
20 25 30

Arg Ser Val Met Asn Thr Arg Ala Leu Phe Pro Leu Leu Phe Thr Val  
35 40 45

Ala Ser Phe Ser Ala Ser Ala Gly Asn Trp Ala Val Lys Asn Gly Trp  
50 55 60

Cys Gln Thr Met Thr Glu Asp Gly Gln Ala Leu Val Met Leu Lys Asn  
65 70 75 80

Gly Thr Ile Gly Ile Thr Gly Leu Met Gln Gly Cys Pro Asn Gly Val  
85 90 95

Gln Thr Leu Leu Gly Ser Arg Ile Ser Ile Asn Gly Asn Leu Ile Pro  
100 105 110

Thr Ser Gln Met Cys Asn Gln Gln Thr Gly Phe Arg Ala Val Glu Val  
115 120 125

Glu Ile Gly Gln Ala Pro Glu Met Val Lys Lys Ala Val His Ser Ile  
130 135 140

Ala Glu Arg Asp Val Ser Val Leu Gln Ala Phe Gly Val Arg Met Glu  
145 150 155 160

Phe Thr Arg Gly Asp Met Leu Lys Val Cys Pro Lys Phe Val Thr Ser  
165 170 175

Leu Ala Gly Phe Ser Pro Lys Gln Thr Thr Thr Ile Asn Lys Asp Ser  
180 185 190

Val Leu Gln Ala Ala Arg Gln Ala Tyr Ala Arg Glu Tyr Asp Glu Glu  
195 200 205

Thr Thr Glu Thr Ala Asp Phe Gly Ser Tyr Glu Val Lys Gly Asn Lys  
210 215 220

Val Glu Phe Glu Val Phe Asn Pro Glu Asp Arg Ala Tyr Asp Lys Val  
225 230 235 240

Thr Val Thr Val Gly Ala Asp Gly Asn Ala Thr Gly Ala Ser Val Glu  
245 250 255

Phe Ile Gly Lys  
260

<210> 61  
<211> 385  
<212> PRT

<213> Escherichia coli

<400> 61

Val Val Ile Ile Asn Ser Thr Ile Leu Ser Gly Ala Gly Ala Ile Pro  
1 5 10 15

Ser Leu Thr Ser Leu Leu Pro Asp Ile Arg Lys Met Leu Leu Val Thr  
20 25 30

Asp Arg Asn Ile Ala Gln Leu Asp Gly Val Gln Gln Ile Arg Ala Leu  
35 40 45

Leu Glu Lys His Cys Pro Gln Val Asn Val Ile Asp Asn Val Pro Ala  
50 55 60

Glu Pro Thr His His Asp Val Arg Gln Leu Met Asp Ala Pro Gly Asp  
65 70 75 80

Ala Ser Phe Asp Val Val Val Gly Ile Gly Gly Gly Ser Val Leu Asp  
85 90 95

Val Ala Lys Leu Leu Ser Val Leu Cys His Pro Gln Ser Pro Gly Leu

100

105

110.

Asp Ala Leu Leu Ala Gly Glu Lys Pro Thr Gln Arg Val Gln Ser Trp  
115 120 125

Leu Ile Pro Thr Thr Ala Gly Thr Gly Ser Glu Ala Thr Pro Asn Ala  
130 135 140

Ile Leu Ala Ile Pro Glu Gln Ser Thr Lys Val Gly Ile Ile Ser Gln  
145 150 155 160

Val Leu Leu Pro Asp Tyr Val Ala Leu Phe Pro Glu Leu Thr Thr Ser  
165 170 175

Met Pro Ala His Ile Ala Ala Ser Thr Gly Ile Asp Ala Leu Cys His  
180 185 190

Leu Leu Glu Cys Phe Thr Ala Thr Val Ala Asn Pro Val Ser Asp Asn  
195 200 205

Ala Ala Leu Thr Gly Leu Ser Lys Leu Phe Arg His Ile Gln Pro Ala  
210 215 220

Val Asn Asp Pro Gln Asp Leu Arg Ala Lys Leu Glu Met Leu Trp Ala  
225 230 235 240

Ser Tyr Tyr Gly Gly Val Ala Ile Thr His Ala Gly Thr His Leu Val  
245 250 255

His Ala Leu Ser Tyr Pro Leu Gly Gly Lys Tyr His Leu Pro His Gly  
260 265 270

Val Ala Asn Ala Ile Leu Leu Ala Pro Cys Met Ala Phe Val Arg Pro  
275 280 285

Trp Ala Val Glu Lys Phe Ala Arg Val Trp Asp Cys Ile Pro Asp Ala  
290 295 300

Glu Thr Ala Leu Ser Ala Glu Glu Lys Ser His Ala Leu Val Thr Trp  
305 310 315 320

Leu Gln Ala Leu Val Asn Gln Leu Lys Leu Pro Asn Asn Leu Ala Ala  
325 330 335



Leu Gly Val Pro Pro Glu Asp Ile Ala Ser Leu Ser Glu Ala Ala Leu  
340 345 350

Asn Val Lys Arg Leu Met Asn Asn Val Pro Cys Gln Ile Asp Leu Gln  
355 360 365

Asp Val Gln Ala Ile Tyr Gln Thr Leu Phe Pro Gln His Pro Phe Lys  
370 375 380

Glu  
385

<210> 62  
<211> 105  
<212> PRT

<213> Escherichia coli

<400> 62

Met Asn Ile Arg Lys Leu Phe Cys Pro Gly Asn Thr Pro Arg Ile Leu  
1 5 10 15

Leu Phe Leu Phe Phe Phe Val Val Ser Ala Ile Thr Thr Ile Ala Cys  
20 25 30

Gly Tyr Thr Glu Lys Asn Ala Thr Gly Asn Val Leu Leu Leu Phe Leu  
35 40 45

Leu Leu Leu Leu Ala His Arg Asn Thr Leu Thr Ser Ile Thr Ala Leu  
50 55 60

Leu Phe Leu Phe Cys Cys Ala Leu Tyr Ala Pro Ala Gly Met Thr Tyr  
65 70 75 80

Gly Lys Ile Asn Asn Ser Phe Ile Val Ala Leu Leu Gln Thr Thr Thr  
85 90 95

Asp Glu Ala Ala Glu Phe Thr Gly Met  
100 105

<210> 63  
<211> 147  
<212> PRT

<213> Escherichia coli

<400> 63

Met Asn Ile Gln Ala Ile Lys Glu Met Val Asn Leu Ile Cys Ser Phe  
1 5 10 15

Leu Phe Ile Phe Phe Leu Ser Ser Ala Phe Val Ser Phe Gly Cys Tyr  
20 25 30

Ala Ile Tyr Glu Leu Phe Leu Trp Asn Asp Ile Ile Val Tyr Ser Trp  
35 40 45

Gly Tyr Ile Leu Ile Val Phe Leu Pro Phe Thr Leu Tyr Val Met Ser  
50 55 60

Phe Glu Ile Leu Phe Phe Ala Ile Ser Gly Arg Arg Leu Ser Lys Val  
65 70 75 80

Thr Met Val Arg Leu Trp Leu Ile Ile Lys Ile Ile Ile Ala Phe Ser  
85 90 95

Ile Cys Ala Val Leu Ile Phe Ser Ser Ile Tyr Lys Lys Glu Leu Leu  
100 105 110

Ser Arg Asn Tyr Ile Ala Cys Ser Gly Ile Pro Ser Gly Trp Met Pro  
115 120 125

Gly Leu Ala Thr Lys Tyr Val Lys Glu Lys Ser Leu Cys Glu Lys Asn  
130 135 140

Gly Asn Asn  
145

<210> 64

<211> 178

<212> PRT

<213> Escherichia coli

<400> 64

Met Phe Pro Ile Arg Phe Lys Arg Pro Ala Leu Leu Cys Met Ala Met  
1 5 10 15

Leu Thr Val Val Leu Ser Gly Cys Gly Leu Ile Gln Lys Val Val Asp  
20 25 30

Glu Ser Lys Ser Val Ala Ser Ala Val Phe Tyr Lys Gln Ile Lys Ile  
35 40 45

Leu His Leu Asp Phe Phe Ser Arg Ser Ala Leu Asn Thr Asp Ala Glu  
50 55 60

Asp Thr Pro Leu Ser Thr Met Val His Val Trp Gln Leu Lys Thr Arg  
65 70 75 80

Glu Asp Phe Asp Lys Ala Asp Tyr Asp Thr Leu Phe Met Gln Glu Glu  
85 90 95

Lys Thr Leu Glu Lys Asp Val Leu Ala Lys His Thr Val Trp Val Lys  
100 105 110

Pro Glu Gly Thr Ala Ser Leu Asn Val Pro Leu Asp Lys Glu Thr Gln  
115 120 125

Phe Val Ala Ile Ile Gly Gln Phe Tyr His Pro Asp Glu Lys Ser Asp  
130 135 140

Ser Trp Arg Leu Val Ile Lys Arg Asp Glu Leu Glu Ala Asp Lys Pro  
145 150 155 160

Arg Ser Ile Glu Leu Met Arg Ser Asp Leu Arg Leu Leu Pro Leu Lys  
165 170 175

Asp Lys

<210> 65  
<211> 209  
<212> PRT

<213> Escherichia coli

<400> 65

Met Phe Leu Lys Arg Lys Trp Tyr Tyr Ala Val Thr Thr Ser Val Val  
1 5 10 15

Ile Thr Leu Cys Gly Gly Gly Tyr Tyr Met Tyr Arg Gln Glu Tyr Gln

20

25

30

Met Val Val Thr Val Pro Thr Ala Asp Ala Asn Asp Pro Asn Trp Pro  
35 40 45

Asn Lys Arg Ile Gln Phe Asp Thr Ser Glu Trp Leu Gln Gln Leu Gln  
50 55 60

Tyr Ile Lys Ile Asp Asp His Tyr Ile Leu Asn Thr Gln Tyr Thr Pro  
65 70 75 80

Ile Ala Asn Leu Asp Asp Phe Gly Ile Thr Leu Lys Leu Gln Asn Ala  
85 90 95

Leu Asn Gly Ser Asp Lys Arg Leu Pro Ala Leu Tyr Gly Leu Ala Glu  
100 105 110

Met Asp Ala Gln Lys Phe Lys Asp Leu Met Arg Gly Lys Ile Lys Cys  
115 120 125

Glu Tyr Leu Arg Thr Thr Phe Asp Ala Glu Thr Leu Lys Pro Val Asn  
130 135 140

Asp Tyr Phe Leu Ile Ser Phe Thr Tyr Lys Asp Lys Trp Tyr Glu Phe  
145 150 155 160

Glu Thr Glu Arg Lys Ile Ser Lys Thr Ser Asp Asp Gly Tyr Phe Leu  
165 170 175

Trp Ala Phe Asp Asn Thr Val His Glu Ala Gly Tyr Trp His Asn Thr  
180 185 190

Asp Pro Ala Ala Tyr Ser Tyr Arg Asp Tyr Gln Asn Gly Lys Ala Val  
195 200 205

Lys

<210> 66

<211> 424

<212> PRT

<213> Escherichia coli

<400> 66

Met Asp Ile Trp Arg Gly His Ser Phe Leu Met Thr Ile Ser Ala Arg  
1 5 10 15

Phe Arg Gln Tyr Val Phe Ser Leu Met Ser Ile Leu Leu Gln Glu Arg  
20 25 30

Lys Met Asn Ile Phe Thr Leu Ser Lys Ala Pro Leu Tyr Leu Leu Ile  
35 40 45

Ser Leu Phe Leu Pro Thr Met Ala Met Ala Ile Asp Pro Pro Glu Arg  
50 55 60

Glu Leu Ser Arg Phe Ala Leu Lys Thr Asn Tyr Leu Gln Ser Pro Asp  
65 70 75 80

Glu Gly Val Tyr Glu Leu Ala Phe Asp Asn Ala Ser Lys Lys Val Phe  
85 90 95

Ala Ala Val Thr Asp Arg Val Asn Arg Glu Ala Asn Lys Gly Tyr Leu  
100 105 110

Tyr Ser Phe Asn Ser Asp Ser Leu Lys Val Glu Asn Lys Tyr Thr Met  
115 120 125

Pro Tyr Arg Ala Phe Ser Leu Ala Ile Asn Gln Asp Lys His Gln Leu  
130 135 140

Tyr Ile Gly His Thr Gln Ser Ala Ser Leu Arg Ile Ser Met Phe Asp  
145 150 155 160

Thr Pro Thr Gly Lys Leu Val Arg Thr Ser Asp Arg Leu Ser Phe Lys  
165 170 175

Ala Ala Asn Ala Ala Asp Ser Arg Phe Glu His Phe Arg His Met Val  
180 185 190

Tyr Ser Gln Asp Ser Asp Thr Leu Phe Val Ser Tyr Ser Asn Met Leu  
195 200 205

Lys Thr Ala Glu Gly Met Lys Pro Leu His Lys Leu Leu Met Leu Asp  
210 215 220

Gly Thr Thr Leu Ala Leu Lys Gly Glu Val Lys Asp Ala Tyr Lys Gly  
225 230 235 240

Thr Ala Tyr Gly Leu Thr Met Asp Glu Lys Thr Gln Lys Ile Tyr Val  
245 250 255

Gly Gly Arg Asp Tyr Ile Asn Glu Ile Asp Ala Lys Asn Gln Thr Leu  
260 265 270

Leu Arg Thr Ile Pro Leu Lys Asp Pro Arg Pro Gln Ile Thr Ser Val  
275 280 285

Gln Asn Leu Ala Val Asp Ser Ala Ser Asp Arg Ala Phe Val Val Val  
290 295 300

Phe Asp His Asp Asp Arg Ser Gly Thr Lys Asp Gly Leu Tyr Ile Phe  
305 310 315 320

Asp Leu Arg Asp Gly Lys Gln Leu Gly Tyr Val His Thr Gly Ala Gly  
325 330 335

Ala Asn Ala Val Lys Tyr Asn Pro Lys Tyr Asn Glu Leu Tyr Val Thr  
340 345 350

Asn Phe Thr Ser Gly Thr Ile Ser Val Val Asp Ala Thr Lys Tyr Ser  
355 360 365

Ile Thr Arg Glu Phe Asn Met Pro Val Tyr Pro Asn Gln Met Val Leu  
370 375 380

Ser Asp Asp Met Asp Thr Leu Tyr Ile Gly Ile Lys Glu Gly Phe Asn  
385 390 395 400

Arg Asp Trp Asp Pro Asp Val Phe Val Glu Gly Ala Lys Glu Arg Ile  
405 410 415

Leu Ser Ile Asp Leu Lys Lys Ser  
420

<210> 67  
<211> 489  
<212> DNA

<213> Escherichia coli

<400> 67

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atgaaactga aagctattat attggccacc ggtcttatta actgtattgt attttcagca      60
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ccagggaatg tggatgtttc tttgggtaat ctgtatgtat cagactttcc caatgcagga    180
agtggatctc catgggttaa ttttgatctg tctctcaccg gatgccagaa tatgaatact    240
gttcgggcaa catttagtgg tactgcggat gggcagacat actatgcgaa tacagggaat    300
gctggcggta tcaagattga aattcaggac agggatggaa gtaatgcac atatacacaat    360
ggtatgttca agacgcttaa tgtacaaaat aataatgcaa cttttaatct taaagcccgt    420
gcagtgagta aaggccaggt tactcctgga aatatcagtt ctgttataac cgtcacctat    480
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<210> 68

<211> 2019

<212> DNA

<213> Escherichia coli

<400> 68

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tcccgcctcg catcagccaa caacgtctcg tctactgttg tcagcgcgcc ggaattaagc    180
gacgccggcg tcaccgccag cgacaaactc cccagagtct tgcccgggct caatattgaa    240
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ttctataacc ccgccgtcac cctgtatgtc gatggcgtcc ctcagctttc caccaacacc    360
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tatggcaaaa gcgctcaggg cgggatcatc aacatcgtca cccagcagcc ggacagcacg    480
ccgcgcggct atattgaagg cggcgtcagt agccgcgaca gttatcgaag taagttcaac    540
ctgagcggcc ccattcagga tggcctgctg tacggcagcg tcaccctgtt acgccagggt    600
gatgacggcg acatgattaa ccccgcgacg ggaagcgatg acttagggcg caccgcgcgc    660
agcataggga atgtgaaact gcgtctggcg ccggacgac agccctggga aatgggcttt    720
gccgcctcac gcgaatgtac ccgcgccacc caggacgcct atgtgggatg gaatgatatt    780
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aagggccgta agctgtcgat cagcgatggg tcaccagacc cgtacatgcg gcgctgcact	840
gacagccaga ccctgagtgg gaaatacacc accgatgact gggttttcaa cctgatcagc	900
gcctggcagc agcagcatta ttcgcgacc ttcccttccg gttcgttaat cgtcaatatg	960
tctcagcgct ggaatcagga tgtgcaggag ctgcgcgctg caaccctggg cgatgcgcgt	1020
accgttgata tgggtgtttgg gctgtaccgg cagaacaccc gcgagaagtt aaattcagcc	1080
tacgacatgc cgacaatgcc ttatttaagc agtaccggct ataccaccgc tgaaacgctg	1140
gccgcataca gtgacctgac ctggcattta accgatcgtt ttgatatcgg cggcggcgtg	1200
cgcttctcgc atgataaatc cagtacacaa tatcacggca gcgtgctcgg caaccctgtt	1260
ggcgaccagg gtaagagcaa tgacgatcag gtgctcgggc agtatccgc aggctatatg	1320
ctgaccgatg actggagagt gtatacccggt gtagcccgag gatataaacc ttccgggtac	1380
aacatcgtgc ctactgcggg tcttgatgcc aaaccgttcg tcgccgagaa atccatcaac	1440
tatgaacttg gcacccgcta cgaaaccgct gacgtcacgc tgcaagccgc gacgttttat	1500
acccacacca aagacatgca gctttactct ggcccggtcg ggatgcagac attaagcaat	1560
gcgggtaaaag ccgacgccac cggcgttgag cttgaagcga agtggcggtt tgcgccaggc	1620
tggtcatggg atatcaatgg caacgtgatc cgttcggaat tcaccaatga cagtgagttg	1680
tatcacggta accgggtgcc gttcgtacca cgttatggcg cgggaagcag cgtgaacggc	1740
gtgattgata cgcgctatgg cgcactgatg ccccgactgg cggttaatct ggtcgggccg	1800
cattatttcg atggcgacaa ccagttgcgg caaggcacct atgccaccct ggacagcagc	1860
ctgggctggc aggcgactga acggatgaac atttccgtct atgtcgataa cctgttcgac	1920
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ggtcgcaccg tcggtatcaa tacgcaatt gatttcttc	2019

<210> 69  
 <211> 738  
 <212> DNA

<213> Escherichia coli

<400> 69

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<210> 70  
 <211> 498  
 <212> DNA

<213> Escherichia coli

<400> 70

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gtcacctata cctatgcg	498

<210> 71  
 <211> 3885  
 <212> DNA

<213> Escherichia coli

<400> 71

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<210> 72  
 <211> 426  
 <212> DNA

<213> Escherichia coli

<400> 72

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<210> 73  
 <211> 954  
 <212> DNA

<213> Escherichia coli

<400> 73

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<210> 74  
 <211> 2175  
 <212> DNA

<213> Escherichia coli

<400> 74

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<210> 75

<211> 3042

<212> DNA

<213> Escherichia coli

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<210> 76

<211> 1362

<212> DNA

<213> Escherichia coli

<400> 76

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ggtgccacgc tggggacgcg tgaatcacgg cttattgagg gggaaatacg tattgctgat	1020
gattacgtcc ttaatcagg gcggtgttcg gacagtgtag ggattttccc ggaatttatt	1080
gatgggtccg gttatctcat ttgccaacg accgggcggt tctttcagat cccttatggg	1140
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gtagttgcac atacttctat gcgtaacatg atgtgttggt ccgttaccgg tgaggccgca	1260
ggtactgccg ccgtgggttc gctacagcaa aattgcaccg tgcgtcagggt tgctatccct	1320
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<210> 77  
 <211> 759  
 <212> DNA

<213> Escherichia coli

<400> 77

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gactggaaca gtggatttgt aaacactcac cgtggtgaag tatggaaagt gactgcggat	180
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catgctgtag cagggagaaa tcatacggtht tcagcaatga cgcatgtcag actctttgac	300
tctgatatga cattctttgg caaaatttht ggccaatggg ataactcatg gggtgacgat	360
ctggacatgt tttatggatt cggttacctc ggctggaacg gcgagtgggg cttttttaaa	420
ccgtatattg gattgcataa tcaatctggg gactacgtat cagctaaata tggtaaacg	480
aatggttgga atggttatgt tgttggctgg acagcagtat taccatttac gttatttgac	540
gaaaaatttg ttttatctaa ctggaatgaa atagaactgg acaggaacga tgcttacacg	600
gagcagcaat ttggccggaa cgggttaaat ggcggtttaa ctattgcctg gaagttctat	660
cctcgctgga aagcaagtgt gacgtggcgt tatttcgata ataagctggg ctacgatggc	720
tttggcgatc aaatgattta tatgcttggg tatgatttc	759

<210> 78  
 <211> 1476  
 <212> DNA

<213> Escherichia coli

<400> 78

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ttagcaacat atggatcatca gatcgthaaa acacctataa tcgacaggct tgcccaggaa	180
ggggtcaaat ttactgacta ctatgcccc gtcctthaa gttcaccttc acgcgcaggg	240
ctattaaccg gccggatgcc atttcgtact ggaattcgct catggattcc ttcaggcaaa	300
gatgttgctt tagggcgtaa cgaactcacg attgctaate tactcaaagc gcaagggtac	360
gacacggcaa tgatgggtaa gctgcatctg aatgcaggcg gcgatcgac cgatcagcca	420
caagcacaag atatgggctt tgattactca ctggctaata cggcgggctt tgttaccgac	480
gccacgctgg ataacgctaa agaacgcccc cgthtatggca tggthttacc gacaggctgg	540
ctacgtaatg ggcaaccac tccacgagcc gataaaatga gcggtgagta tgtcagttcg	600
gaagtcgtca actggctgga taacaaaaag gacagcaagc ctttcttcct ctatgttgct	660
tttaccgaag tgcatagccc cctggcttcg cccaaaaaat acctcgacat gtactcacia	720
tatatgagcg cgtatcagaa gcagcatcct gatttattht atggcgactg ggcagacaaa	780

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ccattaattt tcgggattga tatgccattc caggatgatc caaccgatga atgggcgatc	1260
cgtgatgggtg actggaagat gattatcgat cgcaataata aaccgaaata tctctacaat	1320
ctgaaatctg atcgttatga aacacttaat ctgatcggtg aaaaaccaga tattgaaaaa	1380
cagatgtatg gtaagttttt aaaatataaa actgatattg ataatgattc tctaataaaa	1440
gccagaggtg ataaaccaga agcgggtgacc tggggc	1476

<210> 79  
 <211> 954  
 <212> DNA

<213> Escherichia coli

<400> 79

gtgacaacaa ctatctgcgc tatgggcgaa ttgctggccg agtttttgtc ccgcaaccca	60
catcaaaaat tcaactcagcc tggggagttt atcggggccat ttcccagcgg tgcgccagca	120
attttttgctg ctcagggtggc aaaactgtcc catcggggcca tcttcttttg atgtgttgg	180
aatgatgatt ttgcccgaact cattatagag cgtctccgtc atgaagggtg cattaccgat	240
gggatccatg ttatgaacaa tgccgtcaca ggtacggcgt tcgtgagtta tcaaaatccc	300
cagcagcggg atttcgtctt taatatccct aacagcgcct gcggtttgtt tactgccgag	360
cacattgata aggatctgct taaacagtgt aaccatctgc atattgtggg ctcatcggtg	420
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ggcaccggtt ctttcgatcc caatatctgc aaagagatgc tgagcattcc tgaaatggcg	540
caggctctcg attatttgat tgaatatacg gatattttta tccccagcga aagcgaactc	600
cctttcttcg cgcgtcacaa aaatctgtca gaggaacaga ttgtagcga tcttctccac	660
ggcggcgtaa aacatgtggc gataaaacgc gccagcgtg gggccagcta ttacaagctt	720

aaaaacggta cattacacgc ccagcatggt gcaggtcacg atatcgaaat tatcgatcca	780
acgggtgcag gcgactgctt tggcgcaacg tttatcactc ttttcttata cggtttcccg	840
gcacacaagg cgctgcaata tgcaaatgcc agcggcgcg cgcgcgtaat gcggcaaggt	900
ccgatggaag ggatatcctc actggcagac attgaagact ttttgcagca gcac	954

<210> 80  
 <211> 513  
 <212> DNA

<213> Escherichia coli

<400> 80

atgaagatat tcattagttt atttttggtt ataatatcaa caaattcttt tgctgatgat	60
atcactcatg ccggagtggg tcgtattgaa gggtaatta ccgaaaaaac ctgcattatt	120
tctgatgagt caaaaaattt tacagttaat atgccagacg taccagtag ttcggtaagg	180
agtgcagggg atgttactga aaaggtttat tttccataa cgtaaccgg ctgtggtagt	240
gatgttggca acgcgtatat aaagtttacc ggcaatacag tttctgaaga tgccagttta	300
tataagctgg aagatggctc ggtagagggg cttgcactta cgatttttga taagaacaaa	360
ggcagtatta gtaatgatgt taaaagcatg gttttttcac ttacatcatc agttgataat	420
atattgcatt tttttgcggc ttacaaagca ttaaaaaata atgtccaacc aggggatgca	480
aatgcgtcag tatcgtttat tgtcacctat gat	513

<210> 81  
 <211> 603  
 <212> DNA

<213> Escherichia coli

<400> 81

atgattaaat tccggcttta tattccccct gtaattctcg gttttgttat cgtaccatta	60
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gaaataatat tctcctttcc gtcctgggt gtgcgtattt ctcttcagga attacaactt	180
gagttattgg ttgtatatgc actttttttc agtgtaatgg gtggcatcgg ttggcaattc	240
tcccgagaa cgctcctga attaaaaaac aggctacatt gctggctggg cttttctccg	300
gtctattttt ggtaattct ctcgaatttc attctttata tttctccaga gaaatcagcg	360

ttgctggaaa atatccgaaa tttctttctg acatttgtct ggcttcccct gaatttttcc	420
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gcgttgggat attattgcca gtggcgtagc aaaaatagaa gccataggaa gaagtggggc	540
gattgggtaa cgtgcttaag tttggcgatt ttagctctgg ggccgttatt caattattta	600
caa	603

<210> 82  
 <211> 702  
 <212> DNA

<213> Escherichia coli

<400> 82

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actgcggtaa ccgcagcacc cggcgatgca acacaatttg gtggggcgga tactgactgg	120
agcaccgttg attatcccag gctcactgat atggatgaca acgttgattc aatggggggg	180
aaaatccgct ttactggccg tgtagtgaaa gctacctgta aggtcgcaac cgattcaaaa	240
cagattgaag ttgtcctgcc ggttgtgcct tccaaccttt tcaactggtat cgacgtagaa	300
gcacaggggg cgagcaacca gaccgatttc aatattaatc tgaccgaatg tagcaataca	360
gatgatcaga aaattgagtt ccgttttacc ggtactgcag atagcgctaa taaaacgctc	420
gctaacgaag tagaaggatc aacggatgct gacaacagcg gcaatgcggg ggcgactggt	480
gtagggattc gaatttactc caaaggtagc acgaataatg gtctgattaa cctgaatacc	540
actgcggcag agggtagcgc ctccaccgcc gcttatacaa ttccaggaaa tgctacgacc	600
catgatttca gcgcggcctt tactgcaggt tatgctcaaa acggtagcac tgttgcacca	660
ggtgtagtta agtcaacagc aagttttgtt gtgctgtacg ag	702

<210> 83  
 <211> 1008  
 <212> DNA

<213> Escherichia coli

<400> 83

atgcgtatac atacttattg gtatagaaga tatttcattt tattgattat tatattttca	60
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ccgggttcac cgagtaataa tactacgcct gcaccccttt cttataattt tgggtactata	180

gtggtttctg atgtcaacaa aaatgcbgct ggcactgtat tgccatcaca aatctggaag	240
gttggaacct ataaggctta ttgtaattct cttgatgatt atgaaattta cttcagtgtc	300
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cctaccgaac atggtcctat ccctgtcttt aatgcctaca taggaaactt aaatattcag	660
gttccgcaag gttgcactat taatgagggt acgagtttta ctgttaatat gccggatgtg	720
tgggccagtg aattgagccg ggctgggtgc ggagcgaagc ccgctgggtg tactcctgta	780
gcaacaacta ttccgattaa ttgtacgaat aaagatacag atgcggtaat gacgttggtg	840
ttcgacggta acatttccgc cacacgtgat accaatggga aacaaagtat tattcaggca	900
caagataatc ctgatgttgg tattatgatt atggatagtc agcaaaactc cgtagattta	960
aatgccctgg caacatcagt aggcgttccg ttcagattgg tggaaaac	1008

<210> 84  
 <211> 2592  
 <212> DNA

<213> Escherichia coli

<400> 84

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cctgcttttc tgtcgggtga tactgaagct gttgctgact tatcccgtt cgagaaaggg	180
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gctgacttat taagccttgg aattaacaaa aatgcgctgc cagagcaggc tttggcttca	360
tctgaaaata gttgccttga tttgcgtatc tggtttcccg atgtgcatta catgccggag	420
ctggatgcac agagacttaa actgaccttt ccacaggcga taataaaacg tgacgctcgc	480
ggatatattc caccagaaca gtgggataac ggtattacag cttttttgct gaattatgac	540
ttttctggta ataacgatcg tggtgattac tcttcaaata actattattt aaatcttcgc	600

gctgggatca atattggtgc atggcggtttt cgcgattatt caacctggag tcgtgggagt	660
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tcaggattgc ctttagaagg tgttattaat atccagtggg gagacgggtg tcagcaaaaa	2520
tgtcaggcta attacaagct ccctgaaaca gaactggata atcctgttag ctatgcaact	2580
ctggagtgcc gc	2592

<210> 85  
 <211> 507  
 <212> DNA

<213> Escherichia coli

<400> 85

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ttttttatct cctgctttga tatgcctcag gaaacaacta ctgatatgga cgcttgctcag	180
agagttcagt tagctcaggt tagttgggtt aagaataagt attcgggtggc cgccctgaat	240
cgtttgaaac aagacaacaa ggatgatcca cagcgtctgc aggaattaac tgcttctttt	300
aacgcggaaa gtgaagcttg gacagaatta attgagaaag cgtcaaagtc cgtccaggtt	360
gattatgtag gaggaactat agctggcact gcagttgcat cacgtcaaat tggctctctg	420
gaattacaat cccacgatat ctgggagcac tggctacgat ctcgaggact caactcctcc	480
tcttttgcca gaaccaaagt tcaaatc	507

<210> 86  
 <211> 2139  
 <212> DNA

<213> Escherichia coli

<400> 86

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actgttacag cagatgcaaa taccgcaact gaggcaaccg atgggttatca acctctgagc	180
acctccacgg cgacattaac cgatatgccg atgctggata tcccgcaggt ggtcaatacg	240
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gccgcataca aaatgaaatt gcagtatccg gtcactctgc aattaaacgt caaaaacctg 2040  
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<210> 87  
 <211> 1818  
 <212> DNA

<213> *Escherichia coli*

<400> 87

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 aatcttttac cggcggatta ttatccctgt tataccgtga gcaattttac tttcctgaaa 780  
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cagatattca gtaatttaat tagcaacgcc ttagattcta tggaaggtag ctcttacaaa	1560
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 <211> 303  
 <212> DNA

<213> Escherichia coli

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gctcactatg aatggcttca aatcaacctg actgatacct acgaactagt taaaagggtta	180
atgccgattc cttcactgga cgtgggtggt aaagtaggga aacttgtcct cccggagaaa	240
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cca	303

<210> 89  
 <211> 789  
 <212> DNA

<213> Escherichia coli

<400> 89	
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tatggtcata atttcccctc aaaggggaca attcctgaca gaagggattt ctttgaaaat	180
ccccggcttt ataacgggaa agagacaata aactgaagc cagcgtccac ggattatgtc	240

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<210> 90  
 <211> 1134  
 <212> DNA

<213> Escherichia coli

<400> 90

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<210> 91  
 <211> 1962  
 <212> DNA

<213> Escherichia coli

<400> 91

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<210> 92  
 <211> 4128  
 <212> DNA

<213> Escherichia coli

<400> 92

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gcaacaaaca	ttcctatttt	taataataaa	ggggaattag	taggacatct	tgataaagcg	300
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<210> 93  
<211> 1047  
<212> DNA

<213> Escherichia coli

<400> 93

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<210> 94  
<211> 2520  
<212> DNA

<213> Escherichia coli

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<210> 95

<211> 507

<212> DNA

<213> Escherichia coli

<400> 95

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<210> 96  
<211> 933  
<212> DNA

<213> Escherichia coli

<400> 96

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<211> 2166  
<212> DNA

<213> Escherichia coli

<400> 97

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caggatgaac aaaccaacaa gggtaaactc ctgaaagagc gcggagccga ttacgtcatc      180
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<210> 98  
 <211> 957  
 <212> DNA

<213> Escherichia coli

<400> 98

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<210> 99  
 <211> 1887  
 <212> DNA

<213> Escherichia coli

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<210> 100  
 <211> 5334  
 <212> DNA  
 <213> Escherichia coli

<400> 100

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<211> 681

<212> DNA

<213> Escherichia coli

<400> 101

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<210> 102  
<211> 3327  
<212> DNA

<213> Escherichia coli

<400> 102

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<210> 103  
 <211> 534  
 <212> DNA

<213> Escherichia coli

<400> 103

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gaaaaaagcg	acagctggcg	tctggtgatc	aaaagggacg	aactggaggc	cgacaagccg	480
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<210> 104  
 <211> 840  
 <212> DNA

<213> Escherichia coli

<400> 104

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gatgacaacc	gctatttcac	gctagaaaat	tatacccact	gcgagaacgg	gcagacgttt	300
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aaaggccgct	tattctgggt	atcaacgcgt	gatgatthtc	tggcctttcc	tgccacgtta	420

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tatcgggggg	gacagggcag	atttagtccg	gtgatactta	gatggattct	cagtactgaa	660
gatagctctg	gtgttgctgc	ttcagaagat	gcttatgaat	tgttccgtcc	cggagaagag	720
gtaccctcca	ccggttttta	taaaatcgac	ctgtcacggt	tttatcccaa	aaacaacggt	780
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<210> 105

<211> 1503

<212> DNA

<213> Escherichia coli

<400> 105

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gcgaatactc	tagacacagt	ttacgagctg	ggatcgatga	gtaaggcggt	taccggactt	300
gtggtgcaaa	tactgattca	ggaaggcaga	ctccggcaag	gggatgatat	cattacctat	360
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gag				1503

<210> 106  
 <211> 2046  
 <212> DNA

<213> Escherichia coli

<400> 106

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<210> 107

<211> 492

<212> DNA

<213> Escherichia coli

<400> 107

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<210> 108

<211> 654

<212> DNA

<213> Escherichia coli

<400> 108

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<210> 109

<211> 8198

<212> DNA

<213> Escherichia coli

<400> 109

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<210> 110

<211> 963

<212> DNA

<213> Escherichia coli

<400> 110

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<210> 111  
 <211> 1761  
 <212> DNA

<213> *Escherichia coli*

<400> 111

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<210> 112  
 <211> 2220  
 <212> DNA

<213> Escherichia coli

<400> 112

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<210> 113  
 <211> 408  
 <212> DNA

<213> Escherichia coli

<400> 113

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<210> 114  
 <211> 675  
 <212> DNA

<213> Escherichia coli

<400> 114

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<210> 115  
 <211> 2163  
 <212> DNA

<213> Escherichia coli

<400> 115

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<213> Escherichia coli

<400> 116

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 <211> 2259  
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<213> Escherichia coli

<400> 117

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 <211> 399  
 <212> DNA

<213> Escherichia coli

<400> 118

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<210> 119  
 <211> 858  
 <212> DNA

<213> Escherichia coli

<400> 119

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 <211> 516  
 <212> DNA

<213> Escherichia coli

<400> 120

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<210> 121  
 <211> 546

<212> DNA

<213> Escherichia coli

<400> 121

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<210> 122

<211> 1077

<212> DNA

<213> Escherichia coli

<400> 122

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<210> 123

<211> 2532

<212> DNA

<213> Escherichia coli

<400> 123

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 <212> DNA

<213> Escherichia coli

<400> 124

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gtccttattg gatggattat attcagacct aaagcatata cttattcact aaatgataaa      120
gaaaaagaga tgctcataat gttatcacaa catcctgaaa ctcggtactt tggattttat      180
tccatagaac ttccggctga ttacaaacca acaggaatgg ttatgttcat acaaggatcg      240
gcgatgatcc ctgtagaaac aaagctacaa tattatcctc cttttctgca atatatgaca      300
cgatatgagg cagaactaaa aaacacctca gcattagatc cactggatac gccttatttg      360
aagcaagttc acccactaag tccacctatg aatggagtca tttttgaacg aatgaaagcg      420
aaatacaccc cagattttgc acgagtattg gatgcatgga aatgggaaaa tggcgttacg      480
ttttcagtaa aaatagaagc taaagatggg agagcaaccc gctatgatgg aattagtaag      540
attgccgaat acagttatgg atataatatt ccagaaaaaa aagtacagtt acttactatt      600
ctttcaggac tacaacctcg tgcagataac caacccccat cagaaaataa attggcgata      660
caatatgcac aggttgacgc ttcactactt ggagagtatg aattatctgt agattataaa      720
aatagcaata atattaaaat aagtttgcag acggataata atagttatat tgactcatta      780
ttagatataa gatatccgag taatggaaac agagcatggg ataactctat a              831
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<210> 125

<211> 1098

<212> DNA

<213> Escherichia coli

<400> 125

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atgctacctg agcctgttta tcgacgctgg attatattat taatatctat gttaacagtt      60
ggctactctgt ttatttttatc ggtctggaat tctgcgacat actgggatat ttttatttat      120
ggcgttctgc caatgctggt tctttggcta tgtttgtttg gtattgctgt gaacaaatat      180
gaacaatccg ttgcagcctg tataagttgg gagtctgaaa gacaacaagt taaacaactc      240
tggcaacact ggagccaaaa acaactggca atagttggga atgttctttt tacaccggaa      300
gaaaaaggca tgagtgtttt actggggcca caggaagaga tccctgcata tcctaaaaag      360
gcacgaccgt tattctctgc atcccgttat tctctttcgt ctatattcca tgatattcac      420
cagcaactga cacaacaatt tcctgattat cgtcattatc tacatactat ctacgtatta      480
```

cagcctgaga aatggcgtgg agaaaccgtg agacaggcta ttttccatca atgggactta	540
gtacctgaac ggaccaatac tcttaatcaa atccagtctc tttatgatga aagatttgac	600
ggctctaattc tggttgtttg tttacaaaac tggccggaga ataaacctga agatacgagt	660
gaactgggat cagcacagct tatctcctca tcgtcatttg tacggcagca ccagataccc	720
gttattgctg gtctggggcg tgtaatgcca ttagaaccgg aggagttgga gcataatctg	780
gatgtgttat ttgaatataa ccaattggat aacaaacaac tacagcatgt ctgggtctct	840
ggtttagatg agggaacgat agaaaacctt atgcagtatg ctgaacaaca tcaatgggtca	900
cttcctaaaa aacggcccct acacatgatt gatcattcct ttggccctac aggagagttt	960
atTTTTcctg tctctctggc aatgctgtca gaggctgcc aagaaactga acaaaatcat	1020
ttaattatct atcagtcagc acagtatgct cagaaaaaga gcctttgcct gattacccgg	1080
aagctttatt taaggaca	1098

<210> 126

<211> 780

<212> DNA

<213> Escherichia coli

<400> 126

atgttgaaca gaaaactaaa tatacggcta cgtcattccc tgaacagtca ctgcatacct	60
tccatcatta tcaataacac cgtacgttca tttcagaggt cagtcatgaa taccagagct	120
ctttttcccc tgctgttcac tgtggcatca ttctccgcct ccgccggcaa ctgggctgtc	180
aaaaacggct ggtgtcagac catgacggaa gatggtcagg cgctggtaat gctgaaaaat	240
ggcacgattg gtattaccgg cctgatgcag ggatgcccgga atggtgtaca gacgtcctg	300
ggcagccgta tcagtattaa cggtaacctg atccccacat cacaaatgtg taatcagcag	360
acgggattca gggctgttga ggtggaaatc ggacaggcgc cggaaatggt caaaaaagcc	420
gttactcca tagcagagcg tgatgtgtcc gttttacagg catttggtgt acgaatggaa	480
ttcaccgcgc gtgatatgct gaaggtctgt ccgaaatttg tcacatcact tgccggtttt	540
tccccgaaac agacgaccac tattaataaa gattccgtcc tgcaggctgc ccggcaggca	600
tacgcccggg aatatgacga ggaaacaaca gaaaccgctg attttggtc ttacgaagta	660
aaaggcaata aggttgagtt tgaagtattc aatcctgaag accgtgcgta cgacaaagtg	720
accgtcacgg ttggtgctga cggtaatgcc accggcgcca gcgttgaatt tatcgaaaaa	780

<210> 127  
<211> 1155  
<212> DNA

<213> Escherichia coli

<400> 127

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gtggtaatta tcaatagcac gatactgagc ggcgaggcg ctatcccttc cctgacgtcg      60
ctcttaccgc acatcagaaa aatgctgctg gtcactgacc gtaatattgc gcagctcgac      120
ggtgtgcagc agattcgcgc cttactggaa aagcactgcc cgcagggttaa cgttatcgat      180
aatgtgcccc cagagcccac gcatcatgat gtgcgccagc taatggatgc ccctggcgat      240
gcctcttttg atgtgggtgt cgggatcggc ggtggcagcg tgttggtatg ggcgaagctg      300
ctatcgggtgc tttgccatcc acaatcaccg gggctggatg cgctgcttgc gggtgaaaaa      360
ccgactcagc gggtgcaatc atggttgatt cctacaaccg ccggaaccgg ctcagaagcc      420
acgccgaatg cgattctggc aatccctgag caaagcacga aggtgggtat tatttcccag      480
gtgctgttac cagactatgt ggcgcttttc ccggaactga ccaccagcat gcccgcgcat      540
attgcggcgt ccacgggcat tgatgctctt tgccacttac tggagtgttt taccgcgacc      600
gtggcaaadc cggtcagcga taacgcggcg ctgactgggt taagtaaact tttccggcac      660
attcaacccg ccgtgaacga tcctcaggat ctgcgcgcaa aactggaaat gctgtgggag      720
tcttactatg gcggcgtagc gataacccat gcgggcacgc atctcggtca tgcgtctctc      780
taccggttag gtggcaaata tcactctgcc catggcgctc cgaatgccat cttgctggcg      840
ccgtgcatgg cgtttggtcg cccctgggag gtcgagaaat ttgcccgggt ctgggattgc      900
attcccgatg cggaaccgc cctgagcgcg gaagaaaaat ctcatgccct ggtgacctgg      960
ttacaggcat tagtcaatca actcaagcta cccaacaatc tcgcggtctc cggcgtagcg     1020
ccagaggata ttgcctctct gagcgaggcg gactgaacg tgaagcgctt tatgaacaat     1080
gtgccgtgcc aaattgatct acaggacgta caggccattt accaaacact gtttccgcaa     1140
catccattta aggag                                           1155
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<210> 128  
<211> 315  
<212> DNA

<213> Escherichia coli

<400> 128

atgaatatca gaaaactggt ttgtccggga aacaccccc ggattttatt gtttttattc	60
ttttttgttg tttctgcaat aaccacaatt gcatgcggat aactgagaa gaatgcaaca	120
ggaaatgtgc tgcttctggt tctccttctg ctccttgac acagaaatac cctcacatcc	180
attacagcgc tgttatttct gttctgttgt gcaactgtat gcctgccgg tatgacgtac	240
ggtaaaatca acaacagttt tattgtcgcg ttgttgaga ccacaactga tgaggcagcg	300
gagtttaccg ggatg	315

<210> 129

<211> 441

<212> DNA

<213> Escherichia coli

<400> 129

atgaatattc aggcaataaa agaaatggta aatttaattt gtagtttttt atttatattc	60
tttctgtcct cggcttttgt ttcttttggg tgttatgcta tttatgaatt gtttttatgg	120
aatgatatta ttgtatatag ctggggatat atattaattg tctttttacc ttccacatta	180
tatgtaatgt cgtttgagat ttgttttttt gctattagt ggcgacgatt gtctaaagta	240
acaatgggtgc gcctttgggt gataattaa attattattg ctttctctat ttgcgcagtg	300
ttgatttttt cttcaattta caaaaaagaa ttattatcta gaaattatat tgctttagtg	360
ggtatcccgt ctgggtggat gccgggtctg gcaacgaaat acgttaaaga aaaatcatta	420
tgcgaaaaaa atggcaataa t	441

<210> 130

<211> 534

<212> DNA

<213> Escherichia coli

<400> 130

atgtttccta ttcgttttaa acgtccggcg ttgctctgta tggcgatgct gacggttggt	60
ctgagtggtc gcgggctgat tcagaaagt gtggatgaat cgaaaagcgt ggcctcagcc	120
gttttctaca aacaaatcaa aatactgcat ctcgatttct tctccgcag cgccctgaat	180
acggatgcgg aagatacgcc gctttccacg atgggtgcat tctggcaact gaaaaccgc	240
gaagattttg acaaggcggg ttacgacacc ctgtttatgc aggaagagaa gacgctggag	300



aaggacgtac tggcaaaaca caccgtctgg gtaaaaccgg aaggcacggc atccctgaat	360
gtgccgctgg ataaagagac gcagtttgtc gccattattg ggcagtttta tcaccctgat	420
gaaaaaagcg acagctggcg tctggtgatc aaaagggacg aactggaggc cgacaagccg	480
cgctcgattg aactgatgag aagcgacctg cgactgctgc ctctcaagga taaa	534

<210> 131  
 <211> 627  
 <212> DNA

<213> Escherichia coli

<400> 131

atgttcttaa aaagaaaatg gtattacgca gtgacgacat ctgtcgtcat tactttgtgt	60
ggtggaggat attatatgta caggcaagaa tatcagatgg ttgtcactgt accaactgct	120
gacgcgaacg atcccaactg gccaaataaa aggatacagt ttgataccag cgaatggcta	180
cagcaacttc aatatattaa aatagatgat cattatatat tgaatactca atatactcca	240
attgctaatt tggatgactt tggattaca ttaaaattac agaacgcatt aaatgggtcg	300
gataaaagac ttcttgcaat atatggcctt gctgagatgg atgctcagaa atttaaagac	360
ctgatgcgcg gtaaaattaa atgtgaatat ctgaggacga catttgatgc ggaaacatta	420
aagcctgtca atgattatct ccttatttct tttacttata aagataagtg gtatgaatct	480
gagacagaaa gaaaaaatatc taaaacaagt gatgatgggt attttttgtg ggcatttgat	540
aatactgtcc acgaagcagg ctattggcat aacacagatc cggctgcgta ttcctataga	600
gattaccaga atggttaaggc tgtgaaa	627

<210> 132  
 <211> 1272  
 <212> DNA

<213> Escherichia coli

<400> 132

atggatattt ggcggggaca ttcgtttctg atgacaattt ccgctagggt cagacaatac	60
gttttctctc ttatgtcaat tttattgcag gaacgaaaaa tgaatatttt cactttatcc	120
aaagcaccgc tatacctgtt aatttcacta tttttaccca cgatggccat ggctatcgat	180
ccacctgaac gcgaactttc gcgatttgcc ctgaaaacga attaccttca gtcccctgat	240
gaaggcgtct atgaactggc gtttgataat gccagtaaaa aggtgtttgc agcagtcacc	300

gatcgtgtaa atcgtgaagc caataaaggc tatctgtatt cgtttaattc agattcgctg 360  
aaagtgcgaaa ataaatacac gatgccatac cgggcatttt cgctggcgat aaatcaggat 420  
aaacatcagc tctatatcgg acacaccagc tcagcgtccc tgcgtatcag tatgtttgac 480  
acccaaccg gcaaactggt aagaaccagc gacagggttaa gttttaaaagc ggcaaacgct 540  
gcagattcgc gttttgagca ttttcgccat atgggtttaca gccaggattc cgataccctg 600  
tttgtgagtt atagcaatat gctgaaaacg gccgagggca tgaagcctct gcataagctg 660  
ttaatgctcg acggggacgac gcttgacctta aaaggcgagg ttaaggatgc ttacaaaggt 720  
acagcgtatg gtctgacgat ggatgaaaaa acacagaaaa tctacgttgg cggaagagat 780  
tacatcaacg aaattgatgc gaaaaatcag acgctgctgc gtaccatccc gttgaaagat 840  
ccgagaccac aaatcacaag tgtgcagaat ctggcggtgg actccgcttc tgaccgtgcc 900  
tttgtggtgg tattcgacca tgacgatcgt tccggtacaa aagatggact ctatattttt 960  
gacttacgcg acggtaaaca gcttggtctat gtgcacacag gagccggagc taacgcggtg 1020  
aaatacaatc cgaaatataa cgaactgtat gtcaccaact tcactagcgg caccatcagc 1080  
gtagtggatg ccaccaaata cagcatcacc cgtgaattta acatgccggt ctacccaaac 1140  
cagatggtgt tgtcggacga tatggatacc ctttacattg gcatcaaaga aggctttaac 1200  
cgcgattggg atcctgatgt gtttgtggaa ggagctaaag aacgtattct gagcattgat 1260  
ttgaaaaagt cg 1272

<210> 133

<211> 163

<212> PRT

<213> Escherichia coli

<400> 133

Met Ala Ile Pro Ala Tyr Leu Trp Leu Lys Asp Asp Gly Gly Ala Asp  
1 5 10 15

Ile Lys Gly Ser Val Asp Val Gln Gly Arg Glu Gly Ser Ile Glu Val  
20 25 30

Val Ala Leu Asp His Asp Val Tyr Ile Pro Thr Asp Asn Asn Thr Gly  
35 40 45

Lys Leu Thr Gly Thr Arg Thr His Lys Pro Phe Thr Phe Thr Lys Glu

50

55

60

Ile Asp Ala Ser Ser Pro Tyr Leu Tyr Lys Ala Val Thr Thr Gly Gln  
65 70 75 80

Thr Leu Lys Thr Ala Glu Phe Lys Phe Tyr Arg Ile Asn Asp Ala Gly  
85 90 95

Gln Glu Val Glu Tyr Phe Asn Ile Thr Leu Asp Asn Val Lys Leu Val  
100 105 110

Arg Val Ala Pro Leu Met His Asp Ile Lys Asp Pro Ser Arg Glu Lys  
115 120 125

His Asn His Leu Glu Arg Ile Glu Phe Arg Tyr Glu Lys Ile Thr Trp  
130 135 140

Thr Tyr Lys Asp Gly Asn Ile Ile His Ser Asp Ser Trp Asn Glu Arg  
145 150 155 160

Pro Ser Ala

<210> 134

<211> 550

<212> PRT

<213> Escherichia coli

<400> 134

Val Arg Asn Thr Leu Lys Gln Ala Ile Val Leu Trp Gly Met Val Leu  
1 5 10 15

Leu Leu Val Leu Trp Ser Val Phe Ile Ser Pro Ser Gly Val Leu Arg  
20 25 30

Trp Ala Gly Ala Ala Ala Ile Val Leu Ala Val Ala Ala Leu Leu Ile  
35 40 45

Tyr Arg Arg Arg Gln Ala Trp Thr Glu Met Thr Gly Asp Ala Gly Leu  
50 55 60

Ser Ser Leu Pro Pro Glu Thr Tyr Arg Gln Pro Val Val Leu Val Cys  
65 70 75 80

Gly Gly Leu Ser Ala His Leu Ser Thr Asp Ser Pro Val Arg Gln Val  
85 90 95

Ser Glu Gly Leu Tyr Leu His Val Pro Asp Glu Glu Gln Leu Val Ala  
100 105 110

Gln Val Glu Arg Leu Leu Thr Leu Arg Pro Ala Trp Ala Ser Gln Leu  
115 120 125

Ala Val Ala Tyr Thr Ile Met Pro Gly Ile His Arg Asp Val Ala Val  
130 135 140

Leu Ala Gly Arg Leu Arg Arg Phe Ala His Ser Met Ala Thr Val Arg  
145 150 155 160

Arg Arg Ala Gly Val Asn Val Pro Trp Leu Leu Trp Ser Gly Leu Ser  
165 170 175

Gly Ser Pro Leu Pro Glu Arg Ala Ser Ser Pro Trp Phe Ile Cys Thr  
180 185 190

Gly Gly Glu Val Gln Val Ala Thr Ser Thr Glu Thr Thr Met Pro Ala  
195 200 205

Gln Trp Ile Ala Gln Ser Gly Val Gln Glu Arg Ser Gln Arg Leu Cys  
210 215 220

Tyr Leu Leu Lys Ala Glu Ser Leu Met Gln Trp Leu Asn Leu Asn Val  
225 230 235 240

Leu Thr Ala Leu Asn Gly Pro Glu Ala Lys Cys Pro Pro Leu Ala Met  
245 250 255

Thr Val Gly Leu Val Pro Ser Leu Pro Ala Val Asp Asn Asn Leu Trp  
260 265 270

Gln Leu Trp Ile Thr Ala Arg Thr Gly Leu Thr Pro Asp Ile Ala Asp  
275 280 285

Thr Gly Thr Asp Asp Ala Leu Pro Phe Pro Asp Ala Leu Leu Arg Gln  
290 295 300

Leu Pro Arg Gln Ser Gly Phe Thr Pro Leu Arg Arg Ala Cys Val Thr  
305 310 315 320

Met Leu Gly Val Thr Thr Val Ala Gly Ile Ala Ala Leu Cys Leu Ser  
325 330 335

Ala Thr Ala Asn Arg Gln Leu Leu Arg Gln Val Gly Asp Asp Leu His  
340 345 350

Arg Phe Tyr Ala Val Pro Val Glu Glu Phe Ile Thr Lys Ala Arg His  
355 360 365

Leu Ser Val Leu Lys Asp Asp Ala Thr Met Leu Asp Gly Tyr Tyr Arg  
370 375 380

Glu Gly Glu Pro Leu Arg Leu Gly Leu Gly Leu Tyr Pro Gly Glu Arg  
385 390 395 400

Ile Arg Gln Pro Val Leu Arg Ala Ile Arg Asp Trp Arg Pro Pro Glu  
405 410 415

Gln Lys Met Glu Val Thr Ala Ser Leu Gln Val Gln Thr Val Arg Leu  
420 425 430

Asp Ser Met Ser Leu Phe Asp Val Gly Gln Ala Arg Leu Lys Asp Gly  
435 440 445

Ser Thr Lys Val Leu Val Asp Ala Leu Val Asn Ile Arg Ala Lys Pro  
450 455 460

Gly Trp Leu Ile Leu Val Ala Gly Tyr Thr Asp Ala Thr Gly Asp Glu  
465 470 475 480

Lys Ser Asn Gln Gln Leu Ser Leu Arg Arg Ala Glu Ala Val Arg Asn  
485 490 495

Trp Met Leu Gln Thr Ser Asp Ile Pro Ala Thr Cys Phe Ala Val Gln  
500 505 510

Gly Leu Gly Glu Ser Gln Pro Ala Ala Thr Asn Asp Thr Pro Gln Gly  
515 520 525

Arg Ala Val Asn Arg Arg Val Glu Ile Ser Leu Val Pro Arg Ser Asp  
530 535 540

Ala Cys Gln Asp Val Lys  
545 550

<210> 135

<211> 194

<212> PRT

<213> Escherichia coli

<400> 135

Met Ile Lys Ser Thr Phe Trp Arg Ala Leu Ala Leu Thr Ala Thr Leu  
1 5 10 15

Ile Leu Thr Gly Cys Ser His Ser Gln Pro Glu Gln Glu Gly Arg Pro  
20 25 30

Gln Ala Trp Leu Gln Pro Gly Thr Leu Ile Thr Leu Pro Ala Pro Gly  
35 40 45

Ile Ser Pro Ala Val Asn Ser Gln Gln Leu Leu Thr Gly Ser Phe Asn  
50 55 60

Gly Lys Thr Gln Ser Leu Leu Val Met Leu Asn Ala Glu Asp Gln Lys  
65 70 75 80

Ile Thr Leu Ala Gly Leu Ser Ser Val Gly Ile Arg Leu Phe Leu Val  
85 90 95

Thr Tyr Asp Ala Lys Gly Leu Arg Ala Glu Gln Ser Ile Val Val Pro  
100 105 110

Gln Leu Pro Pro Ala Ser Gln Val Leu Ala Asp Val Met Leu Ser His  
115 120 125

Trp Pro Ile Ser Ala Trp Gln Pro Gln Leu Pro Thr Gly Trp Thr Leu  
130 135 140

Arg Asp Asn Gly Asp Lys Arg Glu Leu Arg Asn Ala Ser Gly Lys Leu  
145 150 155 160

Val Thr Glu Ile Thr Tyr Leu Asn Arg Gln Gly Lys Arg Val Pro Ile

165

170

175

Ser Ile Glu Gln His Val Phe Lys Tyr His Ile Thr Ile Gln Tyr Leu  
                   180                  185                  190

Gly Asp

&lt;210&gt; 136

&lt;211&gt; 129

&lt;212&gt; PRT

&lt;213&gt; Escherichia coli

&lt;400&gt; 136

Met Lys Arg Tyr Ile Lys Trp Phe Ala Ile Thr Ile Phe Ile Ser Met  
   1                  5                  10                  15

Leu Ser Ala Cys Val Arg Thr Ala Pro Val Gln Gln Ile Ser Thr Thr  
           20                  25                  30

Val Ser Val Gly His Thr Gln Glu Gln Val Lys Asn Ala Ile Leu Lys  
           35                  40                  45

Ala Gly Ala Gln Arg Lys Trp Ile Met Thr Gln Val Ser Pro Gly Val  
   50                  55                  60

Ile Lys Ala Arg Tyr Gln Thr Arg Asn His Val Ala Glu Val Arg Ile  
  65                  70                  75                  80

Thr Tyr Thr Ala Thr Tyr Tyr Asn Ile Lys Tyr Asp Ser Ser Leu Asn  
           85                  90                  95

Leu Gln Ala Ser Asp Gly Lys Ile His Lys Asn Tyr Asn Arg Trp Val  
          100                 105                 110

Arg Asn Leu Asp Lys Asp Ile Gln Val Asn Leu Ser Thr Gly Ala Thr  
      115                 120                 125

Leu

&lt;210&gt; 137

&lt;211&gt; 415

<212> PRT

<213> Escherichia coli

<400> 137

Met Lys Arg Lys His Leu Leu Leu Leu Leu Leu Phe Ser Phe Ser Thr  
1 5 10 15

Asn Ser Ala Pro Leu Tyr Ser Leu Ile Arg Glu Ala Val Met His Asp  
20 25 30

Pro Ile Val Met Glu Ala Arg Ala Glu Leu Thr Ser Ala Gln Ser Arg  
35 40 45

Ile Glu Gln Ala Ser Ser Ala His Trp Pro Val Val Thr Ala Thr Gly  
50 55 60

Ser Lys Leu Leu Ser Gln Ser His Arg Tyr Ser Tyr Asp Tyr Asp Thr  
65 70 75 80

Glu Asp Ile Leu Pro Gly Ile Arg Gly Glu Val Asn Ile Phe Ala Ser  
85 90 95

Gly Ala Ile Glu Ala Asp Val Arg Arg Ser Glu Ser Glu Ala Glu Tyr  
100 105 110

Tyr His Tyr Lys Met Glu Glu Thr Lys Glu Glu Thr Ile His Ser Phe  
115 120 125

Val Ser Leu Tyr Leu Asp Ala Leu Arg Glu Lys Gln Ser Ile Ala Val  
130 135 140

Leu Glu Gln Ser Leu Ser Arg His Asn Ala Ile Leu Asn Asp Leu Asn  
145 150 155 160

Thr Ile Ser Ile His Asp Thr Gly Arg Glu Ser Glu Leu Val Gln Ala  
165 170 175

Glu Ala Arg Arg Leu Met Val Arg Gln Gln Ile Asn Ser Arg Ser Arg  
180 185 190

Val Leu Lys Thr Thr Leu Gly Lys Leu Ser Thr Trp Thr Lys Asn Pro  
195 200 205



Val Thr Glu Ala Asp Leu Glu Asn Pro Phe Ser Arg Met Thr Glu Ala  
210 215 220

Lys Leu Leu Thr Asp Phe Thr Gln Ala Pro Gln Lys Gly Asn Pro Ser  
225 230 235 240

Trp Leu Ala Ser Gln Ala Asp Val Glu Ser Lys Lys Ala Ala Leu Lys  
245 250 255

Ala Gln Glu Leu Ala Arg Tyr Pro Arg Val Asp Leu Thr Gly Ser Val  
260 265 270

Thr Arg Asp Asp Gln Gln Ile Gly Val Asn Leu Ser Trp Asp Leu Phe  
275 280 285

Asn Arg Asn Ala Ser Tyr Gly Val Thr Glu Lys Ala Ala Gln Ile Val  
290 295 300

Ala Ala Thr Gly Arg Leu Asp Ser Val Ala Arg Met Ile Asp Glu Thr  
305 310 315 320

Gly Arg Leu Ser Leu Ile Thr Val Arg Gln Ser Arg Gly Glu Met Glu  
325 330 335

Thr Leu Arg Arg Gln Glu Gln Ala Ser Ala Arg Val Val Asp Phe Tyr  
340 345 350

Arg Leu Gln Phe Gln Val Ala Arg Lys Thr Leu Ile Glu Leu Leu Asn  
355 360 365

Ala Glu Asn Glu Leu Tyr Ser Val Gly Leu Ser Arg Val Gln Thr Glu  
370 375 380

Asp Gln Met Leu His Gly Met Leu Asp Tyr Leu Tyr Ser Gln Gly Met  
385 390 395 400

Leu Leu Lys Trp Ser Gly Val Asn Leu Ser Gly Glu Glu Glu Lys  
405 410 415

<210> 138  
<211> 201  
<212> PRT

<213> Escherichia coli

<400> 138

Met Lys Phe Leu Pro Leu Leu Ala Leu Leu Ile Ser Pro Phe Val Ser  
1 5 10 15

Ala Leu Thr Leu Asp Asp Leu Gln Gln Arg Phe Thr Glu Gln Pro Val  
20 25 30

Ile Arg Ala His Phe Asp Gln Thr Arg Thr Ile Lys Asp Leu Pro Gln  
35 40 45

Pro Leu Arg Ser Gln Gly Gln Met Leu Ile Ala Arg Asp Gln Gly Leu  
50 55 60

Leu Trp Asp Gln Thr Ser Pro Phe Pro Met Gln Leu Leu Leu Asp Asp  
65 70 75 80

Lys Arg Met Val Gln Val Ile Asn Gly Gln Pro Pro Gln Ile Ile Thr  
85 90 95

Ala Glu Asn Asn Pro Gln Met Phe Gln Phe Asn His Leu Leu Arg Ala  
100 105 110

Leu Phe Gln Ala Asp Arg Lys Val Leu Glu Gln Asn Phe Arg Val Glu  
115 120 125

Phe Ala Asp Lys Gly Glu Gly Arg Trp Thr Leu Arg Leu Thr Pro Thr  
130 135 140

Thr Thr Pro Leu Asp Lys Ile Phe Asn Thr Ile Asp Leu Ala Gly Lys  
145 150 155 160

Thr Tyr Leu Glu Ser Ile Gln Leu Asn Asp Lys Gln Gly Asp Arg Thr  
165 170 175

Asp Ile Ala Leu Thr Gln His Gln Leu Thr Pro Ala Gln Leu Thr Asp  
180 185 190

Asp Glu His Gln Arg Phe Ala Ala Gln  
195 200

<210> 139

<211> 770

<212> PRT

<213> Escherichia coli

<400> 139

Met Glu Asn Phe Phe Met Lys Asn Ser Lys Val Phe Tyr Arg Ser Ala  
1 5 10 15

Leu Ala Thr Ala Ile Val Met Ala Leu Ser Ala Pro Ala Phe Ala Thr  
20 25 30

Asp Ser Thr Val Ser Thr Asp Pro Val Thr Leu Asn Thr Glu Lys Thr  
35 40 45

Thr Leu Asp Gln Asp Val Val Ile Asn Gly Asp Asn Lys Ile Thr Ala  
50 55 60

Val Thr Ile Glu Thr Ser Asp Ser Asp Lys Asp Leu Asn Val Thr Phe  
65 70 75 80

Gly Gly His Asp Ile Thr Ala Ala Ser Thr Val Asn Gln Asp Phe Val  
85 90 95

Glu Gly Val Lys Val Ser Gly Asn Lys Asn Val Val Ile Asn Ala Thr  
100 105 110

Asp Ser Thr Ile Thr Ala Gln Gly Glu Gly Thr Tyr Val Arg Thr Ala  
115 120 125

Met Val Ile Asp Ser Thr Gly Asp Val Val Val Asn Gly Gly Asn Phe  
130 135 140

Val Ala Lys Asn Glu Lys Gly Ser Ala Thr Gly Ile Ser Leu Glu Ala  
145 150 155 160

Thr Thr Gly Asn Asn Leu Thr Leu Asn Gly Thr Thr Ile Asn Ala Gln  
165 170 175

Gly Asn Lys Ser Tyr Ser Asn Gly Ser Thr Ala Ile Phe Ala Gln Lys  
180 185 190

Gly Asn Leu Leu Gln Gly Phe Asp Gly Asp Ala Thr Asp Asn Ile Thr  
195 200 205

Leu Ala Asp Ser Asn Ile Ile Asn Gly Gly Ile Glu Thr Ile Val Thr  
210 215 220

Ala Gly Asn Lys Thr Gly Ile His Thr Val Asn Leu Asn Ile Lys Asp  
225 230 235 240

Gly Ser Val Ile Gly Ala Ala Asn Asn Lys Gln Thr Ile Tyr Ala Ser  
245 250 255

Ala Ser Ala Gln Gly Ala Gly Ser Ala Thr Gln Asn Leu Asn Leu Ser  
260 265 270

Val Ala Asp Ser Thr Ile Tyr Ser Asp Val Leu Ala Leu Ser Glu Ser  
275 280 285

Glu Asn Ser Ala Ser Thr Thr Thr Asn Val Asn Met Asn Val Ala Arg  
290 295 300

Ser Tyr Trp Glu Gly Asn Ala Tyr Thr Phe Asn Ser Gly Asp Lys Ala  
305 310 315 320

Gly Ser Asp Leu Asp Ile Asn Leu Ser Asp Ser Ser Val Trp Lys Gly  
325 330 335

Lys Val Ser Gly Ala Gly Asp Ala Ser Val Ser Leu Gln Asn Gly Ser  
340 345 350

Val Trp Asn Val Thr Gly Ser Ser Thr Val Asp Ala Leu Ala Val Lys  
355 360 365

Asp Ser Thr Val Asn Ile Thr Lys Ala Thr Val Asn Thr Gly Thr Phe  
370 375 380

Ala Ser Gln Asn Gly Thr Leu Ile Val Asp Ala Ser Ser Glu Asn Thr  
385 390 395 400

Leu Asp Ile Ser Gly Lys Ala Ser Gly Asp Leu Arg Val Tyr Ser Ala  
405 410 415

Gly Ser Leu Asp Leu Ile Asn Glu Gln Thr Ala Phe Ile Ser Thr Gly  
420 425 430

Lys Asp Ser Thr Leu Lys Ala Thr Gly Thr Thr Glu Gly Gly Leu Tyr  
435 440 445

Gln Tyr Asp Leu Thr Gln Gly Ala Asp Gly Asn Phe Tyr Phe Val Lys  
450 455 460

Asn Thr His Lys Ala Ser Asn Ala Ser Ser Val Ile Gln Ala Met Ala  
465 470 475 480

Ala Ala Pro Ala Asn Val Ala Asn Leu Gln Ala Asp Thr Leu Ser Ala  
485 490 495

Arg Gln Asp Ala Val Arg Leu Ser Glu Asn Asp Lys Gly Gly Val Trp  
500 505 510

Ile Gln Tyr Phe Gly Gly Lys Gln Lys His Thr Thr Ala Gly Asn Ala  
515 520 525

Ser Tyr Asp Leu Asp Val Asn Gly Val Met Leu Gly Gly Asp Thr Arg  
530 535 540

Phe Met Thr Glu Asp Gly Ser Trp Leu Ala Gly Val Ala Met Ser Ser  
545 550 555 560

Ala Lys Gly Asp Met Thr Thr Met Gln Ser Lys Gly Asp Thr Glu Gly  
565 570 575

Tyr Ser Phe His Ala Tyr Leu Ser Arg Gln Tyr Asn Asn Gly Ile Phe  
580 585 590

Ile Asp Thr Ala Ala Gln Phe Gly His Tyr Ser Asn Thr Ala Asp Val  
595 600 605

Arg Leu Met Asn Gly Gly Gly Thr Ile Lys Ala Asp Phe Asn Thr Asn  
610 615 620

Gly Phe Gly Ala Met Val Lys Gly Gly Tyr Thr Trp Lys Asp Gly Asn  
625 630 635 640

Gly Leu Phe Ile Gln Pro Tyr Ala Lys Leu Ser Ala Leu Thr Leu Glu  
645 650 655

Gly Val Asp Tyr Gln Leu Asn Gly Val Asp Val His Ser Asp Ser Tyr  
660 665 670

Asn Ser Val Leu Gly Glu Ala Gly Thr Arg Val Gly Tyr Asp Phe Ala  
675 680 685

Val Gly Asn Ala Thr Val Lys Pro Tyr Leu Asn Leu Ala Ala Leu Asn  
690 695 700

Glu Phe Ser Asp Gly Asn Lys Val Arg Leu Gly Asp Glu Ser Val Asn  
705 710 715 720

Ala Ser Ile Asp Gly Ala Ala Phe Arg Val Gly Ala Gly Val Gln Ala  
725 730 735

Asp Ile Thr Lys Asn Met Gly Ala Tyr Ala Ser Leu Asp Tyr Thr Lys  
740 745 750

Gly Asp Asp Ile Glu Asn Pro Leu Gln Gly Val Val Gly Ile Asn Val  
755 760 765

Thr Trp  
770

<210> 140

<211> 660

<212> PRT

<213> Escherichia coli

<400> 140

Met Ser Arg Pro Gln Phe Thr Ser Leu Arg Leu Ser Leu Leu Ala Leu  
1 5 10 15

Ala Val Ser Ala Thr Leu Pro Thr Phe Ala Phe Ala Thr Glu Thr Met  
20 25 30

Thr Val Thr Ala Thr Gly Asn Ala Arg Ser Ser Phe Glu Ala Pro Met  
35 40 45

Met Val Ser Val Ile Asp Thr Ser Ala Pro Glu Asn Gln Thr Ala Thr  
50 55 60

Ser Ala Thr Asp Leu Leu Arg His Val Pro Gly Ile Thr Leu Asp Gly

65

70

75

80

Thr Gly Arg Thr Asn Gly Gln Asp Val Asn Met Arg Gly Tyr Asp His  
85 90 95

Arg Gly Val Leu Val Leu Val Asp Gly Val Arg Gln Gly Thr Asp Thr  
100 105 110

Gly His Leu Asn Gly Thr Phe Leu Asp Pro Ala Leu Ile Lys Arg Val  
115 120 125

Glu Ile Val Arg Gly Pro Ser Ala Leu Leu Tyr Gly Ser Gly Ala Leu  
130 135 140

Gly Gly Val Ile Ser Tyr Asp Thr Val Asp Ala Lys Asp Leu Leu Gln  
145 150 155 160

Glu Gly Gln Ser Ser Gly Phe Arg Val Phe Gly Thr Gly Gly Thr Gly  
165 170 175

Asp His Ser Leu Gly Leu Gly Ala Ser Ala Phe Gly Arg Thr Glu Asn  
180 185 190

Leu Asp Gly Ile Val Ala Trp Ser Ser Arg Asp Arg Gly Asp Leu Arg  
195 200 205

Gln Ser Asn Gly Glu Thr Ala Pro Asn Asp Glu Ser Ile Asn Asn Met  
210 215 220

Leu Ala Lys Gly Thr Trp Gln Ile Asp Ser Ala Gln Ser Leu Ser Gly  
225 230 235 240

Leu Val Arg Tyr Tyr Asn Asn Asp Ala Arg Glu Pro Lys Asn Pro Gln  
245 250 255

Thr Val Glu Ala Ser Asp Ser Ser Asn Pro Met Val Asp Arg Ser Thr  
260 265 270

Ile Gln Arg Asp Ala Gln Leu Ser Tyr Lys Leu Ala Pro Gln Gly Asn  
275 280 285

Asp Trp Leu Asn Ala Asp Ala Lys Ile Tyr Trp Ser Glu Val Arg Ile  
290 295 300

Asn Ala Gln Asn Thr Gly Ser Ser Gly Glu Tyr Arg Glu Gln Ile Thr  
305 310 315 320

Lys Gly Ala Arg Leu Glu Asn Arg Ser Thr Leu Phe Ala Asp Ser Phe  
325 330 335

Ala Ser His Leu Leu Thr Tyr Gly Gly Glu Tyr Tyr Arg Gln Glu Gln  
340 345 350

His Pro Gly Gly Ala Thr Thr Gly Phe Pro Gln Ala Lys Ile Asp Phe  
355 360 365

Ser Ser Gly Trp Leu Gln Asp Glu Ile Thr Leu Arg Asp Leu Pro Ile  
370 375 380

Thr Leu Leu Gly Gly Thr Arg Tyr Asp Ser Tyr Arg Gly Ser Ser Asp  
385 390 395 400

Gly Tyr Lys Asp Val Asp Ala Asp Lys Trp Ser Ser Arg Ala Gly Met  
405 410 415

Thr Ile Asn Pro Thr Asn Trp Leu Met Leu Phe Gly Ser Tyr Ala Gln  
420 425 430

Ala Phe Arg Ala Pro Thr Met Gly Glu Met Tyr Asn Asp Ser Lys His  
435 440 445

Phe Ser Ile Gly Arg Phe Tyr Thr Asn Tyr Trp Val Pro Asn Pro Asn  
450 455 460

Leu Arg Pro Glu Thr Asn Glu Thr Gln Glu Tyr Gly Phe Gly Leu Arg  
465 470 475 480

Phe Asp Asp Leu Met Leu Ser Asn Asp Ala Leu Glu Phe Lys Ala Ser  
485 490 495

Tyr Phe Asp Thr Lys Ala Lys Asp Tyr Ile Ser Thr Thr Val Asp Phe  
500 505 510

Ala Ala Ala Thr Thr Met Ser Tyr Asn Val Pro Asn Ala Lys Ile Trp  
515 520 525



Gly Trp Asp Val Met Thr Lys Tyr Thr Thr Asp Leu Phe Ser Leu Asp  
530 535 540

Val Ala Tyr Asn Arg Thr Arg Gly Lys Asp Thr Asp Thr Gly Glu Tyr  
545 550 555 560

Ile Ser Ser Ile Asn Pro Asp Thr Val Thr Ser Thr Leu Asn Ile Pro  
565 570 575

Ile Ala His Ser Gly Phe Ser Val Gly Trp Val Gly Thr Phe Ala Asp  
580 585 590

Arg Ser Thr His Ile Ser Ser Ser Tyr Ser Lys Gln Pro Gly Tyr Gly  
595 600 605

Val Asn Asp Phe Tyr Val Ser Tyr Gln Gly Gln Gln Ala Leu Lys Gly  
610 615 620

Met Thr Thr Thr Leu Val Leu Gly Asn Ala Phe Asp Lys Glu Tyr Trp  
625 630 635 640

Ser Pro Gln Gly Ile Pro Gln Asp Gly Arg Asn Gly Lys Ile Phe Val  
645 650 655

Ser Tyr Gln Trp  
660

<210> 141  
<211> 719  
<212> PRT

<213> Escherichia coli

<400> 141

Met Arg Asp Glu Met Leu Tyr Asn Ile Pro Cys Arg Ile Tyr Ile Leu  
1 5 10 15

Ser Thr Leu Ser Leu Cys Ile Ser Gly Ile Val Ser Thr Ala Thr Ala  
20 25 30

Thr Ser Ser Glu Thr Lys Ile Ser Asn Glu Glu Thr Leu Val Val Thr  
35 40 45

Thr Asn Arg Ser Ala Ser Asn Leu Trp Glu Ser Pro Ala Thr Ile Gln  
50 55 60

Val Ile Asp Gln Gln Thr Leu Gln Asn Ser Thr Asn Ala Ser Ile Ala  
65 70 75 80

Asp Asn Leu Gln Asp Ile Pro Gly Val Glu Ile Thr Asp Asn Ser Leu  
85 90 95

Ala Gly Arg Lys Gln Ile Arg Ile Arg Gly Glu Ala Ser Ser Arg Val  
100 105 110

Leu Ile Leu Ile Asp Gly Gln Glu Val Thr Tyr Gln Arg Ala Gly Asp  
115 120 125

Asn Tyr Gly Val Gly Leu Leu Ile Asp Glu Ser Ala Leu Glu Arg Val  
130 135 140

Glu Val Val Lys Gly Pro Tyr Ser Val Leu Tyr Gly Ser Gln Ala Ile  
145 150 155 160

Gly Gly Ile Val Asn Phe Ile Thr Lys Lys Gly Gly Asp Lys Leu Ala  
165 170 175

Ser Gly Val Val Lys Ala Val Tyr Asn Ser Ala Thr Ala Gly Trp Glu  
180 185 190

Glu Ser Ile Ala Val Gln Gly Ser Ile Gly Gly Phe Asp Tyr Arg Ile  
195 200 205

Asn Gly Ser Tyr Ser Asp Gln Gly Asn Arg Asp Thr Pro Asp Gly Arg  
210 215 220

Leu Pro Asn Thr Asn Tyr Arg Asn Asn Ser Gln Gly Val Trp Leu Gly  
225 230 235 240

Tyr Asn Ser Gly Asn His Arg Phe Gly Leu Ser Leu Asp Arg Tyr Arg  
245 250 255

Leu Ala Thr Gln Thr Tyr Tyr Glu Asp Pro Asp Gly Ser Tyr Glu Ala  
260 265 270

Phe Ser Val Lys Ile Pro Lys Leu Glu Arg Glu Lys Val Gly Val Phe

275

280

285

Tyr Asp Thr Asp Val Asp Gly Asp Tyr Leu Lys Lys Ile His Phe Asp  
290 295 300

Ala Tyr Glu Gln Thr Ile Gln Arg Gln Phe Ala Asn Glu Val Lys Thr  
305 310 315 320

Thr Gln Pro Val Pro Ser Pro Met Ile Gln Ala Leu Thr Val His Asn  
325 330 335

Lys Thr Asp Thr His Asp Lys Gln Tyr Thr Gln Ala Val Thr Leu Gln  
340 345 350

Ser His Phe Ser Leu Pro Ala Asn Asn Glu Leu Val Thr Gly Ala Gln  
355 360 365

Tyr Lys Gln Asp Arg Val Ser Gln Arg Ser Gly Gly Met Thr Ser Ser  
370 375 380

Lys Ser Leu Thr Gly Phe Ile Asn Lys Glu Thr Arg Thr Arg Ser Tyr  
385 390 395 400

Tyr Glu Ser Glu Gln Ser Thr Val Ser Leu Phe Ala Gln Asn Asp Trp  
405 410 415

Arg Phe Ala Asp His Trp Thr Trp Thr Met Gly Val Arg Gln Tyr Trp  
420 425 430

Leu Ser Ser Lys Leu Thr Arg Gly Asp Gly Val Ser Tyr Thr Ala Gly  
435 440 445

Ile Ile Ser Asp Thr Ser Leu Ala Arg Glu Ser Ala Ser Asp His Glu  
450 455 460

Met Val Thr Ser Thr Ser Leu Arg Tyr Ser Gly Phe Asp Asn Leu Glu  
465 470 475 480

Leu Arg Ala Ala Phe Ala Gln Gly Tyr Val Phe Pro Thr Leu Ser Gln  
485 490 495

Leu Phe Met Gln Thr Ser Ala Gly Gly Ser Val Thr Tyr Gly Asn Pro  
500 505 510

Asp Leu Lys Ala Glu His Ser Asn Asn Phe Glu Leu Gly Ala Arg Tyr  
515 520 525

Asn Gly Asn Thr Trp Leu Ile Asp Ser Ala Val Tyr Tyr Ser Glu Ala  
530 535 540

Lys Asp Tyr Ile Ala Ser Leu Ile Cys Asp Gly Ser Ile Val Cys Asn  
545 550 555 560

Gly Asn Thr Asn Ser Ser Arg Ser Ser Tyr Tyr Tyr Tyr Asp Asn Ile  
565 570 575

Asp Arg Ala Lys Thr Trp Gly Leu Glu Ile Ser Ala Glu Tyr Asn Gly  
580 585 590

Trp Val Phe Ser Pro Tyr Ile Ser Gly Asn Leu Ile Arg Arg Gln Tyr  
595 600 605

Glu Thr Ser Thr Leu Lys Thr Thr Asn Thr Gly Glu Pro Ala Ile Asn  
610 615 620

Gly Arg Ile Gly Leu Lys His Thr Leu Val Met Gly Gln Ala Asn Ile  
625 630 635 640

Ile Ser Asp Val Phe Ile Arg Ala Ala Ser Ser Ala Lys Asp Asp Ser  
645 650 655

Asn Gly Thr Glu Thr Asn Val Pro Gly Trp Ala Thr Leu Asn Phe Ala  
660 665 670

Val Asn Thr Glu Phe Gly Asn Glu Asp Gln Ser Arg Ile Asn Leu Ala  
675 680 685

Leu Asn Asn Leu Thr Asp Lys Arg Tyr Arg Thr Ala His Glu Thr Ile  
690 695 700

Pro Ala Ala Gly Phe Asn Ala Ala Ile Gly Phe Val Trp Asn Phe  
705 710 715

<210> 142  
<211> 199  
<212> PRT

<213> Escherichia coli

<400> 142

Met Arg Lys Val Cys Ala Val Ile Leu Ser Ala Ala Ile Cys Leu Ser  
1 5 10 15

Val Ser Gly Ala Pro Ala Trp Ala Ser Glu His Gln Ser Thr Leu Ser  
20 25 30

Ala Gly Tyr Leu His Ala Arg Thr Asn Ala Pro Gly Ser Asp Asn Leu  
35 40 45

Asn Gly Ile Asn Val Lys Tyr Arg Tyr Glu Phe Thr Asp Ala Leu Gly  
50 55 60

Leu Ile Thr Ser Phe Ser Tyr Ala Asn Ala Glu Asp Glu Gln Lys Thr  
65 70 75 80

His Tyr Ser Asp Thr Arg Trp His Glu Asp Ser Val Arg Asn Arg Trp  
85 90 95

Phe Ser Val Met Ala Gly Pro Ser Val Arg Val Asn Glu Trp Phe Ser  
100 105 110

Ala Tyr Ser Met Ala Gly Val Ala Tyr Ser Arg Val Ser Thr Phe Ser  
115 120 125

Gly Asp Tyr Leu Arg Val Thr Asp Asn Lys Gly Lys Thr His Asp Val  
130 135 140

Leu Thr Gly Ser Asp Asp Gly Arg His Ser Asn Thr Ser Leu Ala Trp  
145 150 155 160

Gly Ala Gly Val Gln Phe Asn Pro Thr Glu Ser Val Thr Ile Asp Leu  
165 170 175

Ala Tyr Glu Gly Ser Gly Ser Gly Asp Trp Arg Thr Asp Ala Phe Ile  
180 185 190

Val Gly Ile Gly Tyr Arg Phe  
195

<210> 143  
<211> 456  
<212> PRT

<213> Escherichia coli

<400> 143

Met Lys Lys Ser Thr Leu Ser Leu Ala Ile Gly Leu Leu Leu Ala Cys  
1 5 10 15

Ser Thr Gly Met Ala Lys Thr Gln His Leu Thr Leu Glu Gln Arg Leu  
20 25 30

Glu Ala Ala Glu Met Arg Ala Ala Lys Ala Glu Gly Gln Val Lys Gln  
35 40 45

Leu Gln Thr Gln Gln Ala Ala Glu Ile Arg Glu Ile Lys Thr Ala Gln  
50 55 60

Gly Asn Thr Pro Val Asn Gly Gln Ser Thr Thr Glu Ser Glu Lys Lys  
65 70 75 80

Asn Ala Thr Pro Pro Asn Leu Leu Leu Ser Gly Tyr Gly Asp Leu Lys  
85 90 95

Ile Tyr Gly Asp Val Glu Phe Asn Met Asp Ala Glu Ser Asn His Gly  
100 105 110

Leu Leu Ala Met Thr Asn Ala Asp Val Asn Ser Asp Pro Thr Asn Glu  
115 120 125

Trp Asn Leu Asn Gly Arg Ile Leu Leu Gly Phe Asp Gly Met Arg Lys  
130 135 140

Leu Asp Asn Gly Tyr Phe Ala Gly Phe Ser Ala Gln Pro Leu Gly Asp  
145 150 155 160

Met His Gly Ser Val Asn Ile Asp Asp Ala Val Phe Phe Phe Gly Lys  
165 170 175

Glu Asn Asp Trp Lys Val Lys Val Gly Arg Phe Glu Ala Tyr Asp Met  
180 185 190

Phe Pro Leu Asn Gln Asp Thr Phe Val Glu His Ser Gly Asn Thr Ala

195

200

205

Asn Asp Leu Tyr Asp Asp Gly Ser Gly Tyr Ile Tyr Met Met Lys Glu  
210 215 220

Gly Arg Gly Arg Ser Asn Ala Gly Gly Asn Phe Leu Val Ser Lys Gln  
225 230 235 240

Leu Asp Asn Trp Tyr Phe Glu Leu Asn Thr Leu Leu Glu Asp Gly Thr  
245 250 255

Ser Leu Tyr Asn Asp Gly Asn Tyr His Gly Arg Asp Met Glu Gln Gln  
260 265 270

Lys Asn Val Ala Tyr Leu Arg Pro Val Ile Ala Trp Ser Pro Thr Glu  
275 280 285

Glu Phe Thr Val Ser Ala Ala Met Glu Ala Asn Val Val Asn Asn Ala  
290 295 300

Tyr Gly Tyr Thr Asp Ser Lys Gly Asn Phe Val Asp Gln Ser Asp Arg  
305 310 315 320

Thr Gly Tyr Gly Met Ser Met Thr Trp Asn Gly Leu Lys Thr Asp Pro  
325 330 335

Glu Asn Gly Ile Val Val Asn Leu Asn Thr Ala Tyr Leu Asp Ala Asn  
340 345 350

Asn Glu Lys Asp Phe Thr Ala Gly Ile Asn Ala Leu Trp Lys Arg Phe  
355 360 365

Glu Leu Gly Tyr Ile Tyr Ala His Asn Lys Ile Asp Glu Phe Ser Gly  
370 375 380

Val Val Cys Asp Asn Asp Cys Trp Ile Asp Asp Glu Gly Thr Tyr Asn  
385 390 395 400

Ile His Thr Ile His Ala Ser Tyr Gln Phe Ala Asn Val Met Asp Met  
405 410 415

Glu Asn Phe Asn Ile Tyr Leu Gly Thr Tyr Tyr Ser Ile Leu Asp Ser  
420 425 430

Asp Gly Asp Lys Ile His Gly Asp Asp Ser Asp Asp Arg Tyr Gly Ala  
435 440 445

Arg Val Arg Phe Lys Tyr Phe Phe  
450 455

<210> 144

<211> 174

<212> PRT

<213> Escherichia coli

<400> 144

Met Asn Gly Lys Ala Phe Leu Ala Cys Val Leu Met Ser Val Val Leu  
1 5 10 15

Thr Gly Cys Glu Thr Ala Lys Lys Ile Ser Gln Val Ile Arg Asn Pro  
20 25 30

Asp Ile Gln Val Gly Lys Leu Met Asp Gln Ser Thr Glu Leu Thr Val  
35 40 45

Thr Leu Leu Thr Glu Pro Asp Ser Asn Leu Thr Ala Asp Gly Glu Ala  
50 55 60

Ala Pro Val Asp Val Gln Leu Val Tyr Leu Ser Asp Asp Ser Lys Phe  
65 70 75 80

His Ala Ala Asp Tyr Asp Gln Val Ala Thr Thr Ala Leu Pro Asp Val  
85 90 95

Leu Gly Lys Asn Tyr Ile Asp His Gln Asp Phe Asn Leu Leu Pro Asp  
100 105 110

Thr Val Lys Thr Leu Pro Pro Ile Lys Leu Asp Glu Lys Thr Gly Tyr  
115 120 125

Ile Gly Val Ile Ala Tyr Phe Ser Asp Asp Gln Ala Thr Glu Trp Lys  
130 135 140

Gln Ile Glu Ser Val Glu Ser Ile Gly His His Tyr Arg Leu Leu Val  
145 150 155 160



His Ile Arg Ala Ser Ala Ile Glu Met Lys Lys Glu Glu Asn  
165 170

<210> 145  
<211> 1144  
<212> PRT

<213> Escherichia coli

<400> 145

Leu Thr Leu Ala Trp Ile Phe Leu Leu Val Trp Ile Trp Trp Gln Gly  
1 5 10 15

Pro Lys Trp Thr Leu Tyr Glu Gln His Trp Leu Ala Pro Leu Ala Asn  
20 25 30

Arg Trp Leu Ala Thr Ala Val Trp Gly Leu Ile Ala Leu Val Trp Leu  
35 40 45

Thr Trp Arg Val Met Lys Arg Leu Gln Lys Leu Glu Lys Gln Gln Lys  
50 55 60

Gln Gln Arg Glu Glu Glu Lys Asp Pro Leu Thr Val Glu Leu His Arg  
65 70 75 80

Gln Gln Gln Tyr Leu Asp His Trp Leu Leu Arg Leu Arg Arg His Leu  
85 90 95

Asp Asn Arg Arg Tyr Leu Trp Gln Leu Pro Trp Tyr Met Val Ile Gly  
100 105 110

Pro Ala Gly Ser Gly Lys Ser Thr Leu Leu Arg Glu Gly Phe Pro Ser  
115 120 125

Asp Ile Val Tyr Thr Pro Glu Ser Ile Arg Gly Val Glu Tyr His Pro  
130 135 140

Leu Ile Thr Pro Arg Val Gly Asn Gln Ala Val Ile Phe Asp Val Asp  
145 150 155 160

Gly Val Leu Thr Thr Pro Gly Gly Asp Asp Leu Leu Arg Arg Arg Leu  
165 170 175

Arg Glu His Trp Leu Gly Trp Leu Met Gln Thr Arg Ala Arg Gln Pro  
180 185 190

Leu Asn Gly Leu Ile Leu Thr Leu Asp Leu Pro Asp Leu Leu Thr Ala  
195 200 205

Asp Lys Ser Arg Arg Glu Thr Leu Val Gln Asn Leu Arg Gln Gln Leu  
210 215 220

Gln Glu Ile Arg Gln Ser Leu His Cys Arg Leu Pro Val Tyr Val Val  
225 230 235 240

Leu Thr Arg Leu Asp Leu Leu Asn Gly Phe Ala Ala Leu Phe His Ser  
245 250 255

Leu Asp Lys Lys Asp Arg Asp Ala Ile Leu Gly Val Thr Phe Thr Arg  
260 265 270

Arg Ala His Glu Ser Asp Gly Trp Arg Ser Glu Leu Gly Ala Phe Trp  
275 280 285

Gln Thr Trp Val Gln Gln Val Asn Leu Ala Leu Ser Asp Leu Val Leu  
290 295 300

Ala Gln Thr Gly Ala Ala Pro Arg Ser Ala Val Phe Ser Phe Ser Arg  
305 310 315 320

Gln Met Gln Gly Thr Gly Glu Ile Val Thr Ala Leu Leu Ala Ala Leu  
325 330 335

Leu Asp Gly Glu Asn Met Asp Val Met Leu Arg Gly Val Trp Leu Thr  
340 345 350

Ser Ser Leu Gln Arg Gly Gln Val Asp Asp Ile Phe Thr Gln Ser Ala  
355 360 365

Ala Arg Gln Tyr Gly Leu Gly Asn Ser Ser Leu Ala Thr Trp Pro Leu  
370 375 380

Val Glu Thr Thr Pro Tyr Phe Thr Arg Arg Leu Phe Pro Glu Val Leu  
385 390 395 400

Leu Ala Glu Pro Asn Leu Ala Gly Glu Asn Ser Val Trp Leu Asn Ser

405

410

415

Ser Arg Arg Arg Leu Thr Ala Phe Ser Thr Cys Gly Ala Ala Leu Ala  
420 425 430

Ala Leu Met Val Gly Ser Trp His His Tyr Tyr Asn Gln Asn Trp Gln  
435 440 445

Ser Gly Val Asn Val Leu Ala Gln Ala Lys Ala Phe Met Asp Val Pro  
450 455 460

Pro Pro Gln Gly Thr Asp Glu Phe Gly Asn Leu Gln Leu Pro Leu Leu  
465 470 475 480

Asn Pro Val Arg Asp Ala Thr Leu Ala Tyr Gly Asp Tyr Arg Asp His  
485 490 495

Gly Phe Leu Ala Asp Met Gly Leu Tyr Gln Gly Ala Arg Val Gly Pro  
500 505 510

Tyr Val Glu Gln Thr Tyr Ile Gln Leu Leu Glu Gln Arg Tyr Leu Pro  
515 520 525

Ser Leu Met Asn Gly Leu Ile Arg Asp Leu Asn Ile Ala Pro Pro Glu  
530 535 540

Ser Glu Glu Lys Leu Ala Val Leu Arg Val Val Arg Met Met Glu Asp  
545 550 555 560

Lys Ser Gly Arg Asn Asn Glu Ala Val Lys Gln Tyr Met Ala Arg Arg  
565 570 575

Trp Ser Asn Glu Phe His Gly Gln Arg Asp Ile Gln Ala Gln Leu Met  
580 585 590

Val His Leu Asp Tyr Ala Leu Glu His Thr Asp Trp His Ala Gln Arg  
595 600 605

Gln Ser Ser Asp Ser Asp Ala Val Ser Arg Trp Thr Pro Tyr Asp Lys  
610 615 620

Pro Ile Ile Asn Ala Gln Gln Glu Leu Ser Lys Leu Pro Ile Tyr Gln  
625 630 635 640

Arg Val Tyr Gln Thr Leu Arg Thr Lys Ala Leu Ser Val Leu Pro Ala  
645 650 655

Asp Leu Asn Leu Arg Asp Gln Val Gly Pro Thr Phe Asp Asn Val Phe  
660 665 670

Val Ala Gly Asn Asp Glu Lys Leu Val Ile Pro Gln Phe Leu Thr Arg  
675 680 685

Tyr Gly Leu Gln Ser Tyr Phe Val Lys Gln Arg Glu Gly Leu Val Glu  
690 695 700

Leu Thr Ala Leu Asp Ser Trp Val Leu Asn Leu Thr Gln Ser Val Ala  
705 710 715 720

Tyr Ser Glu Ala Asp Arg Glu Glu Ile Gln Arg His Ile Thr Glu Gln  
725 730 735

Tyr Ile Ser Asp Tyr Thr Ala Thr Trp Arg Ala Gly Met Asp Asn Leu  
740 745 750

Asn Val Arg Asp Tyr Glu Ala Met Ser Ala Leu Thr Asp Ala Leu Glu  
755 760 765

Gln Ile Ile Ser Gly Asp Gln Pro Phe Gln Arg Ala Leu Thr Ala Leu  
770 775 780

Arg Asp Asn Thr His Ala Leu Thr Leu Ser Gly Lys Leu Asp Asp Lys  
785 790 795 800

Ala Arg Glu Ala Ala Ile Asn Glu Met Asp Tyr Arg Leu Leu Ser Arg  
805 810 815

Leu Gly His Glu Phe Ala Pro Glu Asn Ser Ala Leu Glu Glu Gln Lys  
820 825 830

Asp Lys Ala Ser Thr Leu Gln Ala Val Tyr Gln Gln Leu Thr Glu Leu  
835 840 845

His Arg Tyr Leu Leu Ala Ile Gln Asn Ser Pro Val Pro Gly Lys Ser  
850 855 860

Ala Leu Lys Ala Val Gln Leu Arg Leu Asp Gln Asn Ser Ser Asp Pro  
865 870 875 880

Ile Phe Ala Thr Arg Gln Met Ala Lys Thr Leu Pro Ala Pro Leu Asn  
885 890 895

Arg Trp Val Gly Lys Leu Ala Asp Gln Ala Trp His Val Val Met Val  
900 905 910

Glu Ala Val Arg Tyr Met Glu Val Asp Trp Arg Asp Asn Val Val Lys  
915 920 925

Pro Phe Asn Glu Gln Leu Ala Asp Asn Tyr Pro Phe Asn Pro Arg Ala  
930 935 940

Thr Gln Asp Ala Ser Leu Asp Ser Phe Glu Arg Phe Phe Lys Pro Asp  
945 950 955 960

Gly Ile Leu Asp Asn Phe Tyr Lys Asn Asn Leu Arg Leu Phe Leu Glu  
965 970 975

Asn Asp Leu Thr Phe Gly Asp Asp Gly Arg Val Leu Ile Arg Glu Asp  
980 985 990

Ile Arg Gln Gln Leu Asp Thr Ala Gln Lys Ile Arg Asp Ile Phe Phe  
995 1000 1005

Ser Gln Gln Asn Gly Leu Gly Ala Gln Phe Ala Val Glu Thr Val  
1010 1015 1020

Ser Leu Ser Gly Asn Lys Arg Arg Ser Val Leu Asn Leu Asp Gly  
1025 1030 1035

Gln Leu Val Asp Tyr Ser Gln Gly Arg Asn Tyr Thr Ala His Leu  
1040 1045 1050

Val Trp Pro Asn Asn Met Arg Glu Gly Asn Glu Ser Lys Leu Thr  
1055 1060 1065

Leu Ile Gly Thr Ser Gly Arg Ala Pro Arg Ser Ile Ala Phe Ser  
1070 1075 1080

Gly Pro Trp Ala Gln Phe Arg Leu Phe Gly Ala Gly Gln Leu Thr  
 1085 1090 1095

Asn Val Thr Ser Asp Thr Phe Asn Val Arg Phe Asn Val Asp Gly  
 1100 1105 1110

Gly Ala Met Val Tyr Gln Val His Val Asp Thr Glu Asp Asn Pro  
 1115 1120 1125

Phe Thr Gly Gly Leu Phe Ser Leu Phe Arg Leu Pro Asp Thr Leu  
 1130 1135 1140

Tyr

<210> 146

<211> 489

<212> DNA

<213> Escherichia coli

<400> 146

atggctattc ctgcttatct ctggctgaaa gatgacggcg gcgcggatat caaaggttcc 60  
 gtggacgttc aggggcgcga aggtagcatc gaagtggcgg cgctggatca cgatgtgtac 120  
 atcccgaccg acaataacac cggcaaactg accggtaccc gtactcacia gccttttacg 180  
 ttaccaaag aaatcgatgc gtccagcccg tatctctaca aagctgtgac caccggacag 240  
 accctgaaaa cggcagaatt taagtgttac cgcataacg atgccgggtca ggaagtggag 300  
 tacttcaaca tcacgcttga taacgtcaag ctggtcagag tcgctccgct tatgcacgac 360  
 atcaaggatc cttccagaga gaagcataac cacctggaac gtattgagtt ccgctacgag 420  
 aaaatcacct ggacttacia agacggcaac atcattcatt ccgactcgtg gaatgagcgt 480  
 ccttccgcc 489

<210> 147

<211> 1650

<212> DNA

<213> Escherichia coli

<400> 147

gtgaggaaca cgctgaaaca ggccatcgtg ctgtggggaa tgggtgttact gctgggtgctg 60

tggtcagtgt ttatcagtcg gtctggcgtg ctgagatggg ccggtgcggc ggctatcggt	120
ctggcgggtt ccgcgttggt gatttatcgg cgcaggcagg cgtggacgga gatgaccggc	180
gatgccgggt tgtcatcgct gccgccgga acctaccgac agccggtagt gctggtctgt	240
ggcggctctgt cggcgcacct gtccactgac agcccggtcc gccaggtttc agaagggctg	300
tatctgcatg ttctgatga agaacagctt gtggcgaggc tggagcgatt gctgaccctt	360
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<210> 148

<211> 582

<212> DNA

<213> Escherichia coli

<400> 148

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ctcatcacgc tgcctgcgcc ggggatttca cccgcagtca attcccagca actggttgacc     180
ggcagcttca acggcaaaac ccagtctctg ctagtgatgc ttaatgccga agatcagaaa     240
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ctgggtgacg tgatgctcag ccactggccg attagcgctt ggcaaccgca acttcccaca     420
ggctggacgc ttcgcgacaa cggcgacaaa cgcgagctgc gtaacgccag cggcaaactg     480
gtcacggaaa tcacctatct gaatcgccag ggaaaacgcg tgccaatcag cattgagcag     540
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<210> 149

<211> 387

<212> DNA

<213> Escherichia coli

<400> 149

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cagggttaaaa atgccatttt gaaagcaggc gcgagcgca agtggattat gacgcaagtg     180
tcccctggag ttattaaagc tcgctatcaa acacgaaatc acgttgacga ggttcgtatt     240
acatatacag ctacctacta taacatcaaa tatgacagta gcctgaatct gcaggcttct     300
gatggaaaaa ttcataaaaa ctataaccgc tgggtgcgta acctggataa agatatacag     360
gttaacttat ctacaggagc aacgtta                          387
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<210> 150

<211> 1245

<212> DNA

<213> Escherichia coli

<400> 150



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gagttaactt cggcacaatc ccgcatagag caggcaagct ctgcacattg gccagttgtc	180
acagctacag gaagtaaact cctttcacaa agtcaccgtt attcctacga ttatgacact	240
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<210> 151  
 <211> 603  
 <212> DNA

<213> Escherichia coli

<400> 151

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cggacgatta aagatctgcc gcagccgctg cgatctcagg gtcagatgtt gatcgccgc	180

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acctatctgg agagcattca acttaatgat aaacagggcg atcgaccga tattgctctt	540
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cag	603

<210> 152  
 <211> 2295  
 <212> DNA

<213> Escherichia coli

<400> 152

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<210> 153  
 <211> 1980  
 <212> DNA

<213> Escherichia coli

<400> 153

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<210> 154  
 <211> 2157  
 <212> DNA

<213> Escherichia coli

<400> 154

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<210> 155

<211> 600

<212> DNA

<213> Escherichia coli

<400> 155

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ggggctggcg tgcagtttaa cccgaccgaa tccgtgacca ttgaccttgc ttatgaaggt 540  
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<210> 156  
 <211> 1368  
 <212> DNA

<213> Escherichia coli

<400> 156

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1368

<210> 157

<211> 522

<212> DNA

<213> Escherichia coli

<400> 157

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<212> DNA

<213> Escherichia coli

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